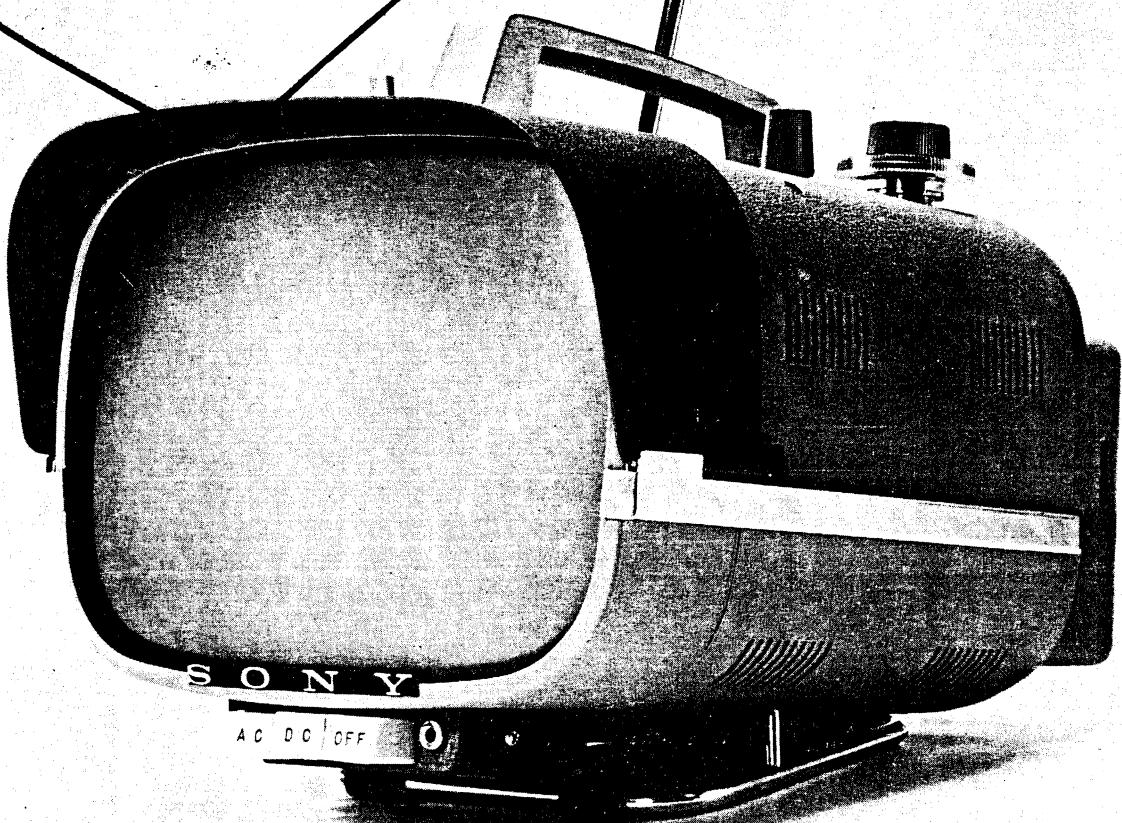


# TV8-301W(E & T)

3297

ARCHIVEXEMPLAR



**W:** for U. S. A.    **E:** for Continental Europe (excl. France, Monaco, Italy & OIRT members)    **T:** for Italy

## Specifications

Picture Tube :	210HB4	8 inches, 90-degree Deflection Aluminized Screen, Automatic Control Focus, 8½" in Length
Semi-conductors :	23 Transistors and 18 (19 for 8-301E & T) Diodes	
Channel Coverage :	A-2 to A-13 (8-301W), E-2 to E-11 (8-301E), A to H (8-301T)	
Scanning System :	Interlaced 525 (625 for 8-301E & T) Lines, 30 (25 for 8-301E & T) Frames per second	
Sound System :	4.5 (5.5 for 8-301E & T) Mc Intercarrier System	
Maximum Sensitivity :	Approx. 30/ $\mu$ V at Antenna Input for All Channels	
With Built-in Antenna :	Receives up to 62 miles in flat terrain	
With External Antenna :	Receives up to 93 miles in flat terrain	
Intermediate Frequencies :	Video 26.75 Mc    Sound 22.25 Mc (21.25 Mc for 8-301E & T)	
Video Band Width :	3.0 Mc/-3 dB (3.5 Mc/-3 dB for 8-301E & T)	
Resolution :	Vertical 400 Lines    Horizontal 250 Lines	
Audio Output :	300 Milliwatts with 10% Distortion	
External Antenna Input :	300 $\Omega$ balanced, 75 $\Omega$ unbalanced	
Speaker :	4" x 2½" PM Dynamic	
Earphone Jacks :	2	
Power Requirements :	DC 12 Volts, 13 Watts AC 50/60 cps 117 V (220 V for 8-301E & T) 19 Watts Car Battery provided 12 Volts	
Batteries :	12 Volts (Two Units of 6 volts) 3 Ampere Hours, Lead Acid, leakproof	
Life of Batteries :	More than 100 recharging cycles under proper maintenance	
Recharging Hours :	7 to 10 Hours with Built-in Charger	
Dimensions :	Main Unit 8½" (W) x 7" (H) x 9" (D) Battery Case 6½" (W) x 37/8" (H) x 2" (D)	
Weight :	Main Unit 13 pounds Battery 4 pounds	

**SONY®**  
**SERVICING GUIDE**

3297

★The SONY Transistor TV 8-301 is designed on the following requirements.

1. Small Size and Light Weight
2. Low Power Consumption
3. Sensitivity and Selectivity equivalent to that of Tube TV
4. High Reliability
5. Easier Servicing

For 1 and 2, 8" picture tube of 90° deflection is adopted.

The diameter of the neck of the tube is reduced to 25 mm to save deflecting power approx. 10% as compared with that required for the conventional picture tube of which the neck is 28 mm in diameter.

Reduced diameter of the tube neck gives another advantage of higher deflecting sensitivity which permits to reduce the length of the tube neck also. Consequently, the overall length of the picture tube is reduced to 215 mm. The current required for the tube is 1.05 Ampere at 12 Volts to operate at the anode voltage of 6 KV.

Regarding 3, the maximum sensitivity of  $30\mu\text{V}$  is obtained.

A manual gain control is added to cover wide variation of the field strength which is beyond AGC action.

This feature is very important for a portable TV set.

To simplify the servicing procedure, the circuits are arranged on three separate printed circuit boards of plug-in type.

#### Transistors Specially Developed for TV 8-301

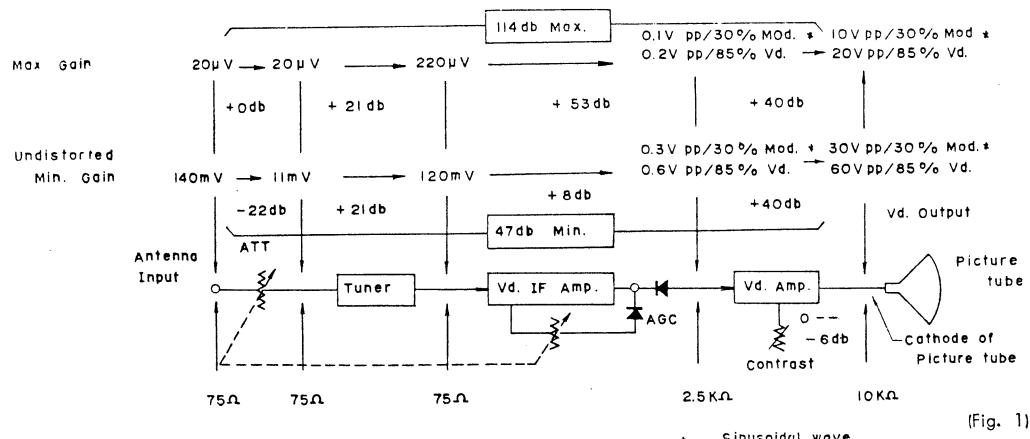
For Tuner	2SA161	Mesa Type PNP Germanium Transistor
For Video Output	2SC15	Mesa Type NPN Silicon Transistor
For Horizontal Output	2SC41	Mesa Type NPN Silicon Transistor
For Vertical Output	2SB147	Alloy Type PNP Germanium Transistor
(2SC140 Epitaxial Transistor for 8-301E & T)		

#### Circuits

As illustrated in the circuit schematic diagram, 23 transistors, 18 (19 for 8-301E & T) diodes and 2 high-voltage rectifiers are used. Among them, 10 transistors are of conventional type while 6 transistors are developed for the TV.

As to the diodes, 7 are of medium power type represented by the number of 1N60 and 11 (12 for 8-301E & T) are of lower type.

Level Diagram for Video Circuit



(Fig. 1)

\* Sinusoidal wave

#### 1. Video Signal Circuit (See Fig. 1)

Required video output for the picture tube is 10 Volts p-p for the 30% AM antenna input signal against 20 Volts p-p which is required in the conventional set.

This comes from the result that the modulating sensitivity of the picture tube is approx. 6 dB higher than that of the conventional tube.

##### 1-1 Impedance Matching in the VHF Tuning Circuit

Constants of LC circuit for 200 Mc are given by  $L \times C = 0.6\mu\text{H} \cdot \text{pF}$

If L and C are adjustable, appropriate values are as follows :

$$L = 0.1\mu\text{H} \quad C = 6\text{pF}$$

To obtain the band width of 6 Mc in the VHF amplifier stage, the resonant impedance should be  $1 \sim 4 \text{ K}\Omega$

for the values of L and C mentioned above.

This value of the impedance matches the input impedance of VHF vacuum tube, however, in case of transistor, it should be stepped down to one tenth of this value.

### 1-2 VHF Amplifier

2SA161, the Mesa type transistor, has the power gain of 14 dB at 200 Mc, however, in the actual set, the circuit is designed to give power gain of 10 dB for stable performance.

The circuit is arranged in grounded base instead of grounded emitter which gives higher gain.

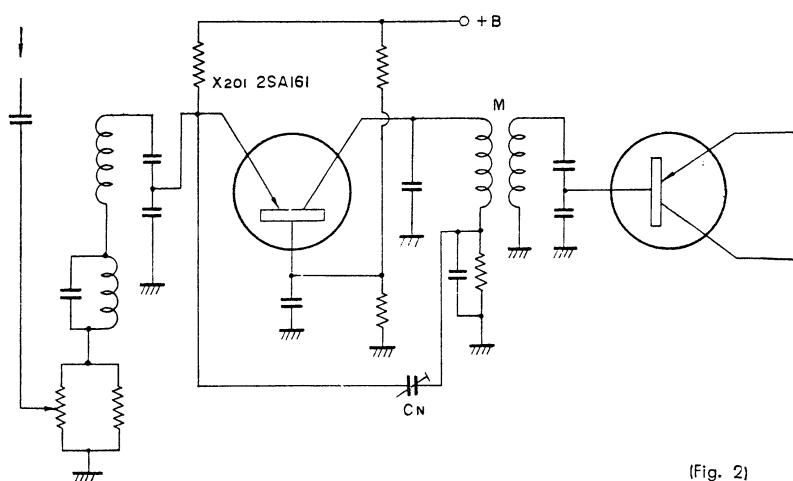
This arrangement comes from the following reason.

In the grounded emitter circuit, not only the adjustment of the neutralizing network is difficult but also the deviation of the power gain between channels becomes higher.

The gain in the circuit is approx. 10 dB lower than that in the conventional cascode amplifier which uses twin triode tube (6BQ7A for instance).

This disadvantage is compensated enough by increased gain in VIF stage which is achieved from the merit of higher signal-to-noise ratio in the mixer stage as compared with the vacuum tube mixer. As the result, the maximum sensitivity of  $30\mu\text{V}$  is obtained at the signal-to-noise ratio of 30 dB against  $200\sim400\mu\text{V}$  in the tube TV. The noise figure at 200 Mc is approx. 7 dB.

Fundamental Circuit of VHF Amplifier



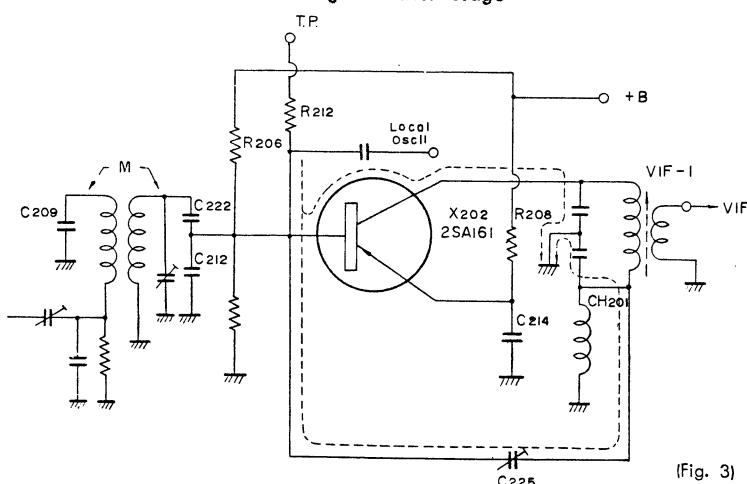
(Fig. 2)

### 1-3 Mixer

The noise level in the transistor mixer is extremely low because of lower power consumption (12 mW) and low injection voltage of local oscillation (0.2 Volt r. m. s.) which are 1/50 and 1/20 of that in the vacuum tube mixer respectively.

However, in the transistor mixer, the signal-to-noise ratio is often deteriorated by beat frequency due to coupling between the input and output circuits.

Neutralizing in Mixer Stage

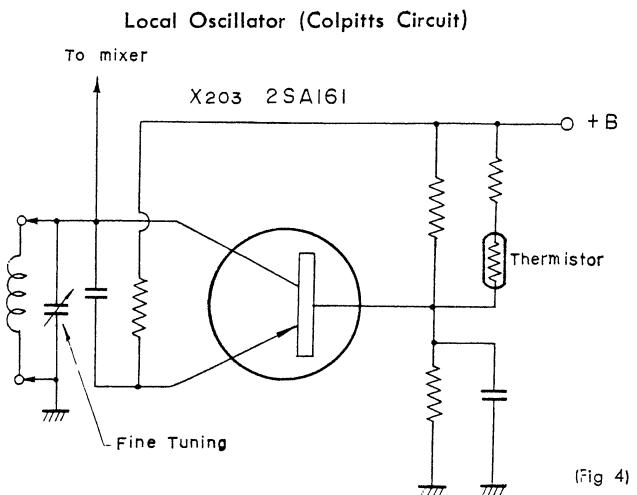


(Fig. 3)

To prevent this trouble, conventional neutralizing network is used as shown in Fig. 3. Although the undesirable feed back can be prevented by short circuiting the base and the emitter of the transistor with respect to the IF frequency inserting a trap into the input circuit, it is not desirable to do this because the IF characteristics around the resonant frequency of the trap will be deteriorated.

#### 1-4 Local Oscillator

A grounded base Colpitts circuit is used to minimize the number of the terminals which should be switched by the channel selector. A stabilizing resistor  $R_E$  connected in series with the emitter serves to isolate the emitter from the circuit with respect to VHF. The oscillating frequency can be adjusted approx. 1.6 Mc in the lowest channel and 3 Mc in the highest channel by the fine tuning device.



#### 1-5 Video IF Amplifier

This section consists of four staggered stages using five elements.

Maximum Gain :	53 dB for 30% AM signal
Undistorted Minimum Gain :	8 dB
Adjustable Range of Gain :	45 dB
Band Width :	3.0 Mc / -3 dB (3.5 Mc / -3 dB for 8-301E & T)
VIF :	26.75 Mc
SIF :	22.25 Mc (21.25 Mc for 8-301E & T)
Difference of gain between VIF and SIF :	Approx. 30 dB

Fundamental circuit for each stage is shown in Fig. 5.

VIFT is designed in accordance with the following factors.

- a) Impedance matching between the collector and the base of the next stage
- b) To give the values determined by the resonant impedance P and Q required to obtain specified frequency characteristics to the elements L and C

A  $5\mu F$  capacitor connected between the emitter and the base in each stage prevents intermodulation which will cause phase distortion in the video signal.

This intermodulation is caused by the following reason.

When the input level of AM carrier exceeds some 10 mV, detected current of AM component due to non-linearity in  $I_B-E_{BE}$  characteristics flows through the base circuit.

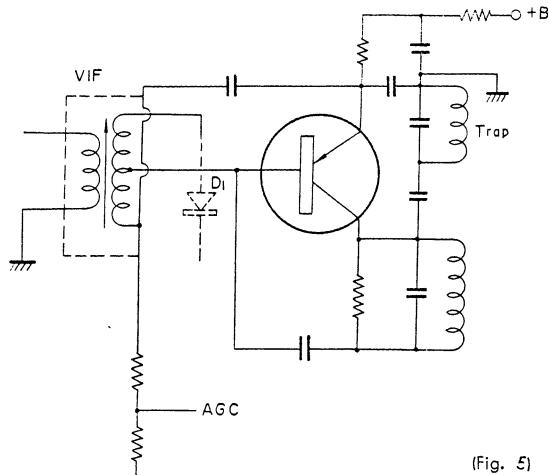
The detected current charges the by-pass capacitor for VHF connected between the base and the emitter to cause intermodulation.

The trap in the first stage eliminates beat frequency from the sound signal.

Center frequency of each stage is as follows:

VIFT1	25.2 Mc (24.80 Mc for 8-301E & T)
VIFT2	Non-resonant
VIFT3	23.75 Mc (23.21 Mc for 8-301E & T)
VIFT4	26.45 Mc (26.39 Mc " )
VIFT5	24.3 Mc (23.84 Mc " )
VIFT6	26.1 Mc (25.76 Mc " )
Trap1	22.25 Mc (21.25 Mc " )

### Fundamental Circuit for VF Amplifier



(Fig. 5)

#### 1-6 Video Detector

Detector diode and AGC diode are equipped in a heavy shield case. Undistorted max. detector output of 1.0 Volt p-p is obtained, however, optimum value for the best contrast is 0.8 Volt p-p.

#### 1-7 AGC Circuit and Antenna Input Network

When the base bias current is charged to control the power gain, input and output impedances vary in wide range.

This variation of the impedances changes the effective value of Q of the elements in the VIF section. Accordingly, transfer characteristics of the VIF signal vary in wide range.

Besides the factor mentioned above, another problem remains. For higher signal input level, lower gain of the transistor is desired. However, the linearity of the characteristics of the transistor deteriorates as the gain is decreased and non-linear phase distortion is caused.

To overcome these difficulties, diode D1 is connected to the secondary winding of VIFT2.

The diode D1 is normally biased in backward direction.

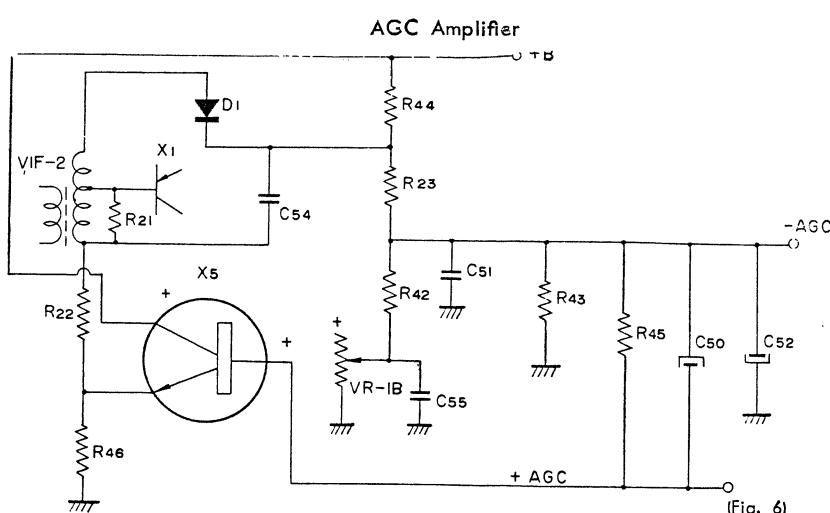
As the input signal level increases, AGC current injected to the base of X5, the grounded collector AGC amplifier, changes to increase the emitter current.

Accordingly, the voltage drop across R46 which is connected to the emitter of X5 increases to cancel the backward bias for D1 partially. This leads to decrease the impedance of D1 and the damping effect in the input circuit increases to prevent distortion.

Bias control potentiometer VR-1B incorporates with gain control potentiometer VR-1A.

The AGC current is delivered from a peak value rectifier network. No AGC effect is extended to the tuner section.

Gain control potentiometer VR-1A serves to attenuate the input signal level for the tuner by 20 dB max.



(Fig. 6)

Overall gain control range reaches 60 dB as VR-1A incorporates with VR-1B, the bias control for D1, as mentioned above.

When the gain control knob is turned, VR-1A gives no effect before the angle position reaches one thirds of full range to prevent deterioration of signal-to-noise ratio at moderate input signal level.

### 1-8 Video Amplifier

Output stage of video amplifier uses 2SC15, the Mesa type silicon transistor.

Specifications for 2SC15 are as follows :

Max. Voltage between Collector and Base :	V <sub>CBO</sub> 90 V
P <sub>C</sub>	750 mW
f <sub>a</sub>	180 Mc
h <sub>fe</sub>	30
C <sub>ob</sub>	2 pF

By driving the output stage with emitter followered 2SC73, the following data are obtained :

Input Resistance	R <sub>in</sub> = 7 KΩ
Band Width	3.0 Mc at 3 dB down
Power Gain	40 dB
I <sub>c</sub>	4.5 mA
V <sub>c</sub>	40 Volts
Collector Input Power	180 mW

The collector power source which requires  $85V \times 4.5mA = 382.5mW$  is obtained by rectifying the horizontal pulse.

This contrast of the picture is controlled by VR-1A and VR-1B as explained in 1-7.

VR3, the gain control of the video amplifier, is adjusted in the factory.

## 2. Synchronization and Deflection

### 2-1 Separation of Synchronizing Pulse

Clipping action of the transistor is superior to that of the vacuum tube in usual case. However, this action deteriorates suddenly when the input level of the video signal at the base terminal of the pulse separating transistor drops to the value below 0.5 Volt p-p and loss of synchronization is resulted.

In the portable TV set, the separating circuit for the synchronizing pulse should be designed to operate satisfactorily at various video signal level because the set is usually carried to different places where the field strength varies in wide range. To fulfil this requirement, a special circuit is used in 8-301 which secures synchronization even when the output level of the video signal varies from 5 to 40 Volts p-p.

The output signal of X12, the last stage transistor in the video amplifier, is applied to D6 to separate the synchronizing pulse from the video signal.

The separated pulse is amplified by X13, 2SC73 and then applied to X14, 2SB49 to be splitted into positive and negative pulses.

These pulses are applied to push-pull type discriminator where a saw-tooth reference wave obtained from horizontal drive stage is fed.

The output of the phase discriminator is fed to the base of X18, the horizontal oscillator, to control the frequency.

### 2-2 Vertical Deflection Circuit

An on-off pulse is generated in the blocking oscillator driven by X15 (2SB51). While X15 is in cut-off, the voltage from the power source charges C122 ( $100\mu F$ ) up to 12 Volts through R123 (330Ω) and C122 discharges rapidly while X15 is in conduction. Thus a saw-tooth signal is obtained. The saw-tooth signal is fed to the vertical deflection coil after amplified by a two stage amplifier consisting of a driver stage and an output stage.

The arrangement of the amplifier differs according to the types of the TV set.

American type W	European type E, Italian type T
Driver stage X16 (2SB51) in grounded collector	X16 (2SB51) in grounded emitter
Output stage X17 (2SB147), the germanium power transistor	X17 (2SC140), the silicon epitaxial transistor
In the type W, the wave-form is corrected by a negative feedback through R129 (5Ω) and an integrating network consisting of VR8 (500Ω) and C124 (30μF).	
In the type E and in the type T, the correction of the wave form is made by a negative feedback through R129 (3Ω) and a positive feedback through R139 (1 KΩ).	
The drift of the operating point of X17 due to the temperature variation is compensated by a thermistor Th2	

(S-300) enclosed between X17 and the heat sink plate in the type W. In the type E and in the type T, the thermistor is enclosed beneath the heat sink plate. In each type, a quick response is achieved. The vertical deflection coil is wound in a toroidal type instead of saddle type usually used in the conventional TV set. By this arrangement, the deflection sensitivity is improved by 40%. However, on the other hand, the back pulse in the deflection coil increases in its amplitude considerably. This problem is solved by inserting a clipping network using a diode D19 in the collector circuit of the output transistor X17 (2SC140) to suppress the amplitude to 40 Volts p-p. In some TV sets of W type manufactured in early period the back pulse is damped by R131 ( $220\Omega$ ) and C130 ( $0.2\mu F$ ) instead of using the diode.

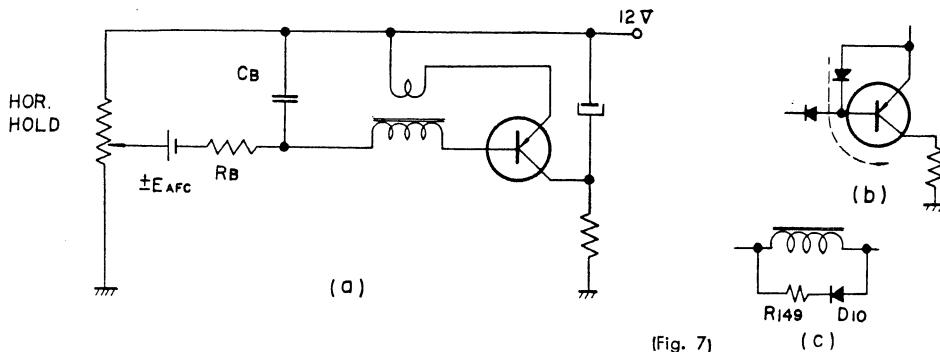
### 2-3 AFC Phase Discriminator Circuit

The push-pull type discriminator circuit requires the input of both positive and negative synchronizing pulses. The saw-tooth reference signal for AFC is obtained by integrating positive pulse having the amplitude of 14 Volts p-p developed at the collector of the horizontal drive transistor after it is delayed by approx. 3 micro-seconds.

In the type W, the positive pulse is obtained directly from the collector of the horizontal drive transistor, while in the type E and in the type T, a flyback pulse having the amplitude of 14 Volts p-p developed in a stepped down tertiary winding in the horizontal output transformer is utilized.

### 2-4 Horizontal Blocking Oscillator Circuit

Fundamental Circuit of Horizontal Blocking Oscillator



(Fig. 7)

Fig. 7a shows the fundamental oscillator circuit in which the oscillation frequency is controlled by varying the base bias voltage for the transistor. As obvious in the figure, the AFC voltage is fed in series with the base circuit.

Although a L-C tank circuit tuned to 15.75 Kc is provided in the base circuit, the oscillation frequency tends to drift due to the variation of the characteristics of the transistor as the temperature changes. This problem is solved by using the transistor 2SB511 specially chosen in the standpoint of stable operation. There are some discrepancies in the arrangements of the oscillator between the types of the TV set.

#### Type W

1. A negative pulse obtained from the mid point in the emitter coil is utilized as the input signal to the driving stage.
2. To prevent the influence of  $I_{CO}$  upon the time constant network in the base circuit, a germanium diode is inserted in series with the base of X15 (2SB51).
3. To prevent the transistor from run-away, a germanium diode is connected across the base and the emitter of X15. (See Fig. 7b)

#### Type E and Type T

1. A positive pulse obtained from a tertiary winding in blocking transformer is utilized as the input signal to the driver stage.
2. To minimize the influence of  $I_{CO}$  upon the time constant network, the capacitance of  $C_B$  is increased.
3. The frequency drift is compensated by inserting a damping network consisting of D10 (1T26) and R149 ( $140\Omega$ ) in parallel with the primary winding (base side) of the horizontal blocking transformer. (See Fig. 7c.)

### 2-5 Horizontal Drive Circuit

Switching operation of the horizontal driver stage is controlled by pulse from the horizontal oscillator stage. The horizontal output transistor conducts while the transistor in the driver stage is in cut-off period. The

base current required for the conduction of the output transistor is obtained from the energy  $1/2Li^2$  stored in the horizontal drive transformer during the conduction period of the driving transistor. In the type W which uses PNP transistor (2SB144) in the driver stage, a negative pulse is required for conduction. However, in the type E and in the type T which use NPN transistor (2SC140) in the driver stage, a positive pulse is required for conduction.

## 2-6 Horizontal Output Circuit

Mesa type silicon power transistor 2SC41 which has the following specifications is used.

$V_{CBO}$	Higher than 150 Volts
$P_c$ max	50 Watts
$I_c$ max	5 Amperes
$f_\alpha$	20 Mc
$h_{fe}$	28
$R_s$	$0.3\Omega$ (Collector Saturation Resistance)

Total power required for horizontal deflecting circuit is 8.4~9.0 Watts (12 Volts, 0.7~0.75 Ampere). Secondary winding of fly-back transformer HOT generates 6 KV at optimum contrast by means of voltage doubling. The horizontal deflecting coil is of saddle type which has inductance of 117 micro Henries and DC resistance of  $0.14\Omega$ . It carries 75% of saw-tooth current of 5.0 Amperes p-p. High voltage is rectified by a voltage doubler rectifying circuit using two high-voltage rectifiers, IDK1.

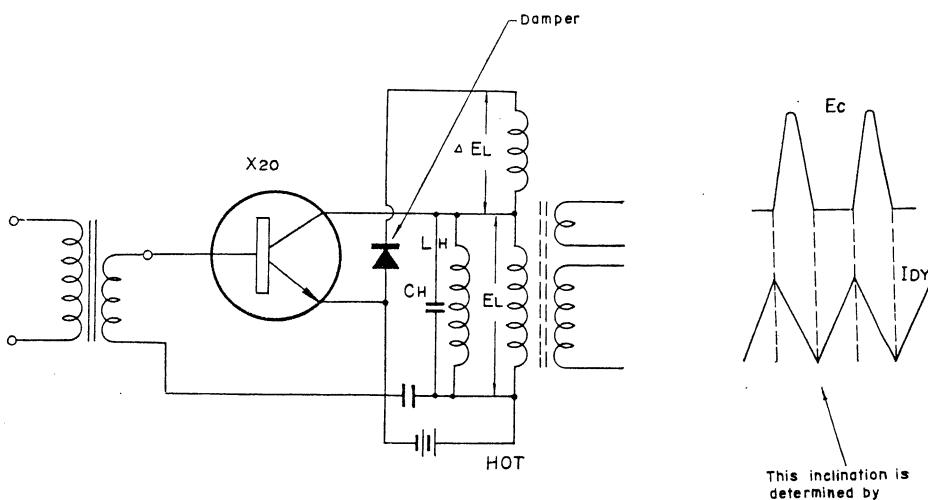
Ratings of IDK1 are as follows :

Max. Plate Voltage	7 KV
$E_f$	0.65 V
$I_f$	220 mA

To improve linearity of sweeping wave form and deflecting efficiency, a damper diode is connected to the fly-back transformer HOT at the point tapped up by the voltage which corresponds to the shoulder in  $V_{CE}$ — $I_C$  characteristic curve of the transistor.

The rate of this tapping-up is important. If it is tapped up too much, the operating point of the transistor rises above the shoulder of the characteristic curve and higher collector loss will be resulted.

Horizontal Output Stage



(Fig. 8)

$$\frac{L_H}{R_H + r_{\oplus}}$$

Where

$R_H$ : DC Resistance of  $L_H$

$r_{\oplus}$ : Forward Resistance of Damper Diode

## 3. Sound Circuit

Intercarrier system is adopted. The circuit consists of two IF stages, Foster-Seeley type discriminator and two AF stages using five transistors and two diodes.

## 4. Power Supply

This set requires approx. 13 Watts (12 Volts, 1.04 Ampere) for battery operation and approx. 19 Watts for AC operation. A bridge type rectifier is adopted to minimize the copper loss of the power transformer. Car

battery cord serves to operate the set from the car battery through the cigarette lighter plug of the car. The car battery cord is provided with a special plug which enables the user to change connection in accordance with the grounded terminal of the car battery.

### Suggestions for Servicing :

#### Tuner

- a) When the tuner is repaired, all the lead wires and the transistor leads should be arranged in exactly the same manner in length and bent as before.
- b) Do not adjust C218 unless the frequency of the local oscillator shifts from adequate value throughout all channels.
- c) To check whether the transistor in RF stage is oscillating or not, check the variation of the base potential when the connection between the collector and the ground is disconnected. If no change is observed, the transistor is not oscillating. The mixer transistor and local oscillator can be checked in the same manner also.
- d) Do not use a long wire for the antenna connection and for connection between the gain control and attenuator which are not shielded.
- e) Do not change the grounding point in the circuit.
- f) Be careful to "end finishing" of the co-axial cable. Deformation of the insulator of the cable due to melting may cause trouble.

#### Video Amplifier

- a) When X11 or X12 is replaced, check the V<sub>c</sub> of X12 which should be 40 Volts  $\pm$  3 Volts. If the value exceeds 50 Volts, zig-zag picture will be resulted at over-contrast as the synchronizing pulse is not separated satisfactorily. This is corrected by adjusting R91 (18 K $\Omega$ ).
- b) Picture may become zig-zag also when C101 (0.1 $\mu$ F) leaks.

#### Sound Circuit

De-tuned trap (4.5 Mc) in the emitter circuit of X11 causes poor sound volume.

Turn the fine tuning knob to the direction which gives lower sound volume and adjust the cores of the trap and SIFT2 to obtain maximum sound volume.

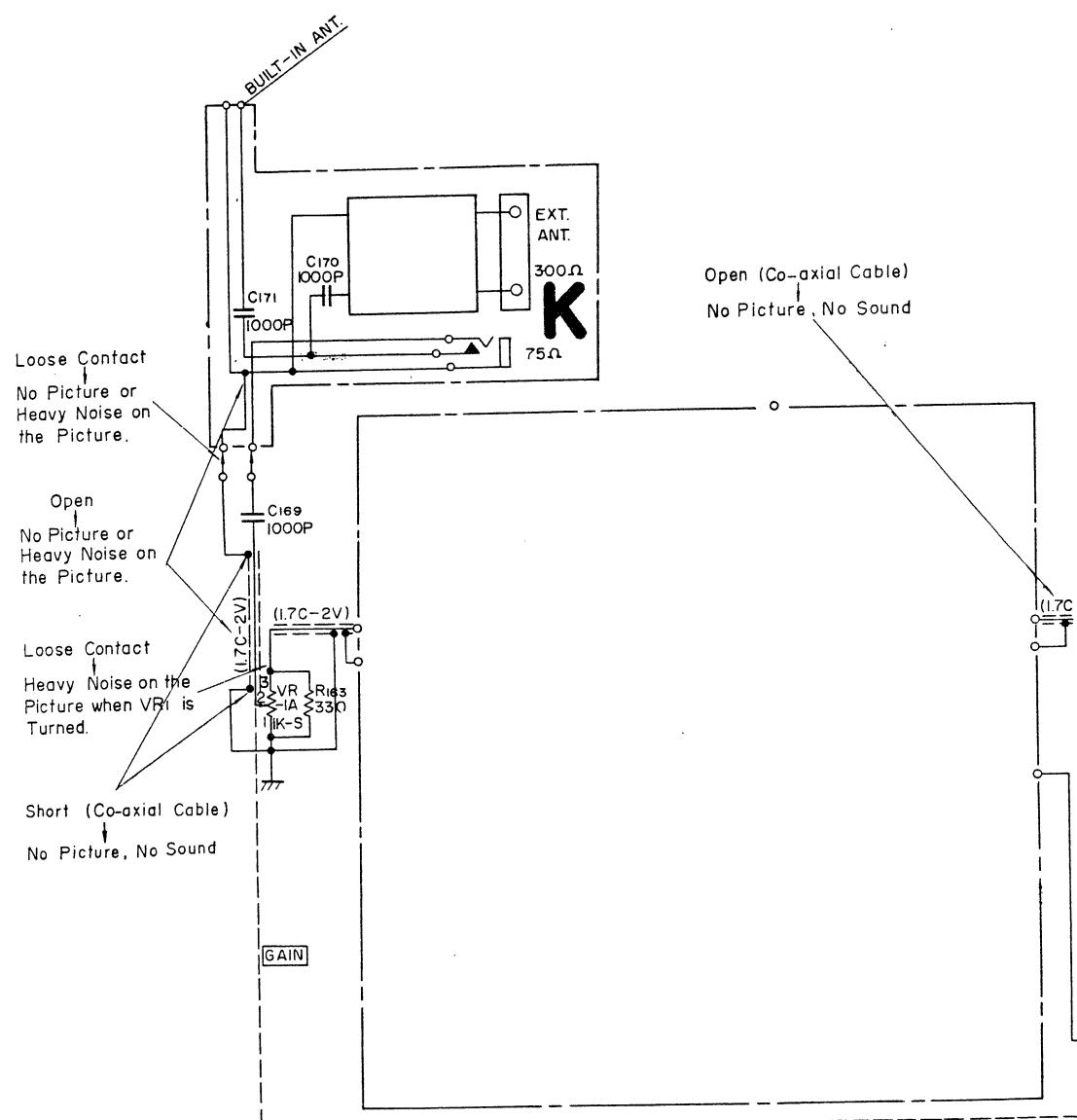
## Trouble Shooting Chart

Trouble	Try or Check	Result	Cause
Does not operate on AC Power Line			Blown Fuse Defective Push Button Switch Defective AC Power Cord
Does not operate on Battery			Discharged Battery Defective Push Button Switch Defective Car Battery Cord
Does not operate on both AC Power Line and Battery			Defective Push Button Switch Defective Filter Capacitor C161, C162
Battery can not be charged			Defective Battery Open R162 (6Ω)
No Picture but Raster appears			Trouble in Tuner Defective Transistor X1~X4 (2SA124) Defective By-pass Capacitor in VIF Circuit (C23, C32, C38, C45) Defective Transistor X11 (2SC73), X12 (2SC15) Improper Base Bias Voltage for X11 Check R91 & R94.
No Raster	Check Anode Voltage of Picture Tube.	High Voltage is observed.  High Voltage is not observed.	Position of Brightness Control VR4 is too low. Defective Picture Tube Defective Rectifier 1DK1 Defective Fly-back Transformer HOT Defective Transistor X20 (2SC41) Break down of Capacitor C150 (500pF), C151 (500pF)
Soft Focus	Change wiring for G4 of Picture Tube to G3 or to Ground.	Fixed No Effect	OK Defective Picture Tube
Flicker on Picture	Adjust angle of Antenna or position of Antenna Cord.	Fixed No Effect	OK Defective Silicon Diode D15 ~D18 (1T20105) Defective Filter Capacitor C161, C162 (4000μF) or cold soldering on it
No Reception in a certain channel	Adjust angle of Antenna.	Fixed No Effect	OK Trouble in Tuner
Low Contrast	Adjust Gain Control.	Fixed No Effect	OK Incomplete contact between Cabinet and Grounding Contact Leaf Defective Transistor X1~X4 (2SA124) Defective By-pass Capacitor C23, C32, C38, C45 De-tuned VIFT1~VIFT6 Trouble in Tuner
Wobbling on top of Picture	Adjust length and angle of Antenna. Adjust Gain Control to reduce gain. Adjust Contrast Control VR3 (500Ω).	Fixed	OK
Insufficient Brightness	Check Voltage at G2 Terminal of Picture Tube.	250 Volts is observed.  Different Voltage is observed.	Defective Picture Tube Decreased emission of Rectifier 1DK1 Defective Fly-back Transformer HOT Defective Diode D14 (1T2013) Defective Transistor X20 (2SC41)

Trouble	Try or Check	Result	Cause
Loss of Synchronization on both Horizontal and Vertical Sweep			Defective Transistor X13 (2SC73) Defective Transistor X11 (2SC73) Defective Transistor X12 (2SC15) Defective Diode D6
Loss of Synchronization on Horizontal Sweep			Defective Potentiometer VR5 ( $10\text{k}\Omega$ ) Defect in printed wiring of Synchronizing Circuit Defective Diode D7, D8 (1T22)
Vertical Deflection does not operate			Defective Transistor X17, (2SB147 or 2SB232) (2SC140 for 8-301E & T) Defective Transistor X15, X16 (2SB51) Defective Blocking Oscillator Transformer VBT Defective Pulse Stop Diode D9 (1T22) Disconnected wiring for Deflection Coil
Loss of Vertical Synchronization			Defective Integrating Capacitor C107, C108, C114 ( $0.1\mu\text{F}$ ) Defective Capacitor C109 ( $5\mu\text{F}$ )
Poor Vertical Linearity	Adjust VR7, VR8, VR9	Fixed No Effect	OK Defective Transistor X17 (2SB147 or 2SB282) (2SC140 for 8-301E & T) Defective Transistor X16 (2SB51) Defective Capacitor C122 ( $100\mu\text{F}$ )
Distorted Sound	Listen with Earphone Apply Sound Signal to VR2.	No Distortion No Distortion with Speaker Still distorts	Defective Speaker Defective one of Diodes in Discriminator Circuit Defective Audio Transformer SDT, SOT Defective one of Transistors X9 and X10 (2SB52)
Low Sound Volume	Apply Sound Signal to VR2.	Still Low Volume. Sound is heard loudly from Speaker.	Defective Speaker Defective Transistor X8 (2SD64), X9, X10 (2SB52) Defective Transistor X6, X7 (2SA122) Defective Capacitor C62, C68 ( $0.01\mu\text{F}$ ) De-tuned VIFT
Heavy Buzz	Adjust Fine Tuning Re-align SIFT3 Re-align VIFT		
No Sound with Picture in normal			Defective Speaker Trouble in Speaker wiring Defective Earphone Jack Defective Transistor X6, X7 (2SA122), X8 (2SD64), X9, X10 (2SB52) Open winding of Audio Transformer of SIFT Defective By-pass Capacitor C62, C68
Over Deflection of Vertical Sweep			Defective Capacitor C124 ( $30\mu\text{F}$ ) Open VR8 (500-B)
Thick stripes appear on top of Picture			Open Thermistor TH3 (S-25) Defective Transistor X20 (2SC41)
Vertical Shrinkage	Adjust VR7	Fixed No Effect	OK Improper value of C122 which should be within $100\mu\text{F} \pm 20\%$

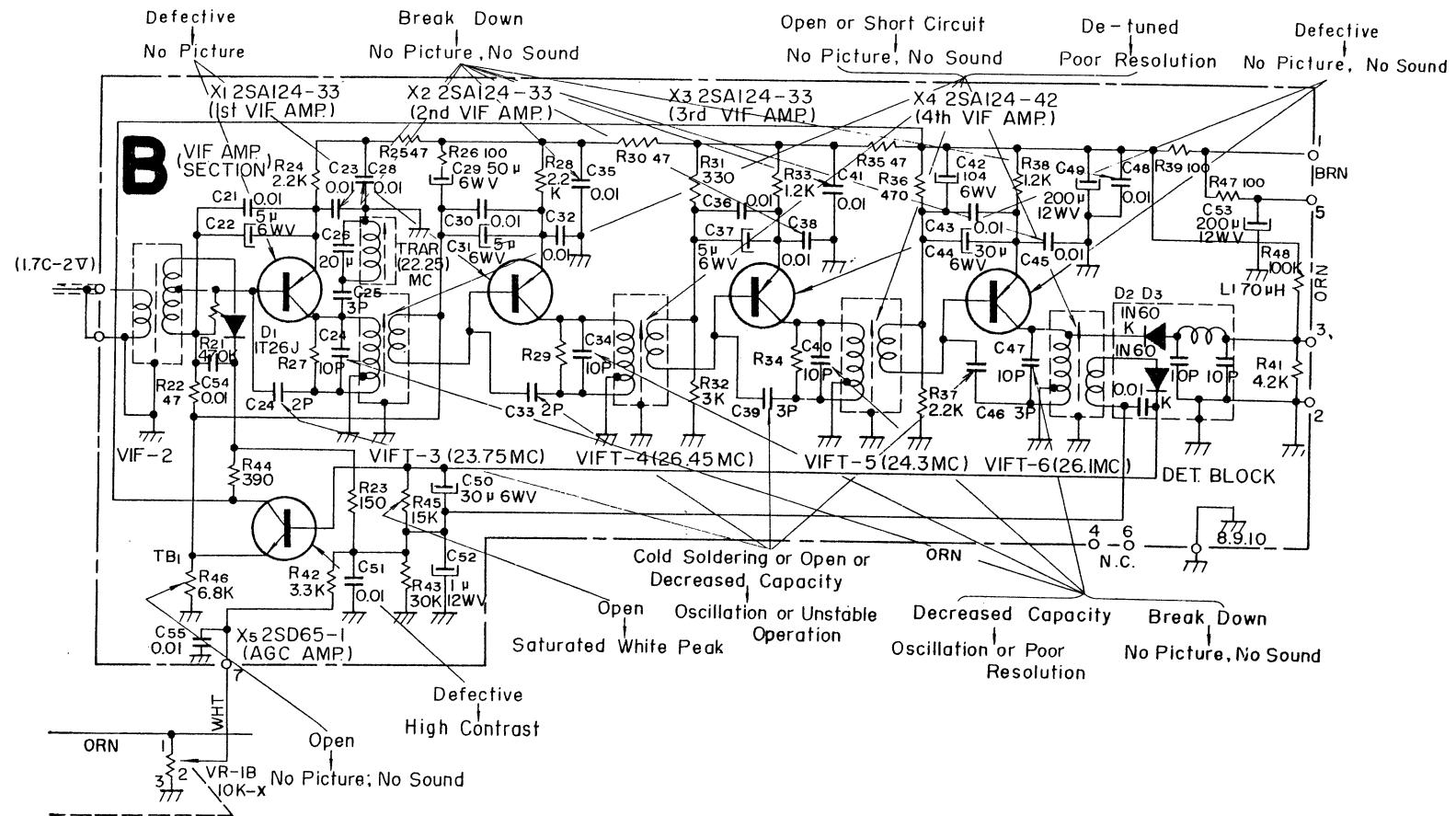
## Trouble Shooting Chart

### —Section K—



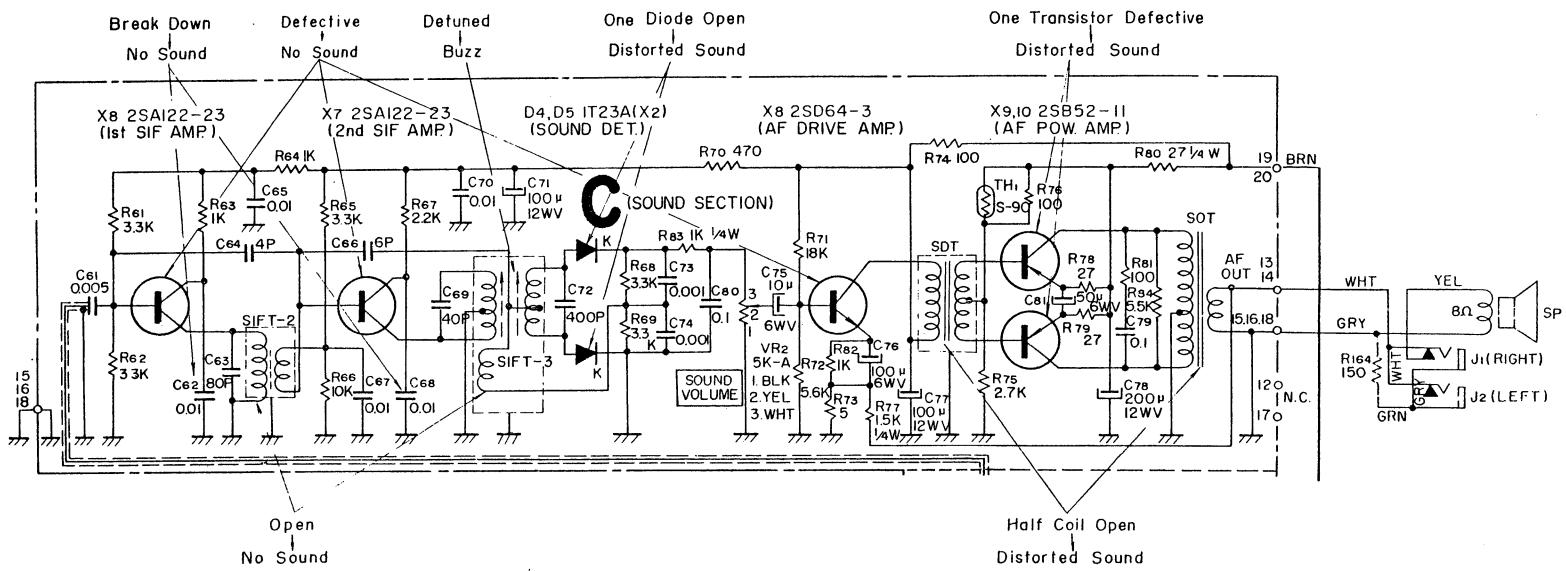
## Trouble Shooting Chart

**—Section B—**



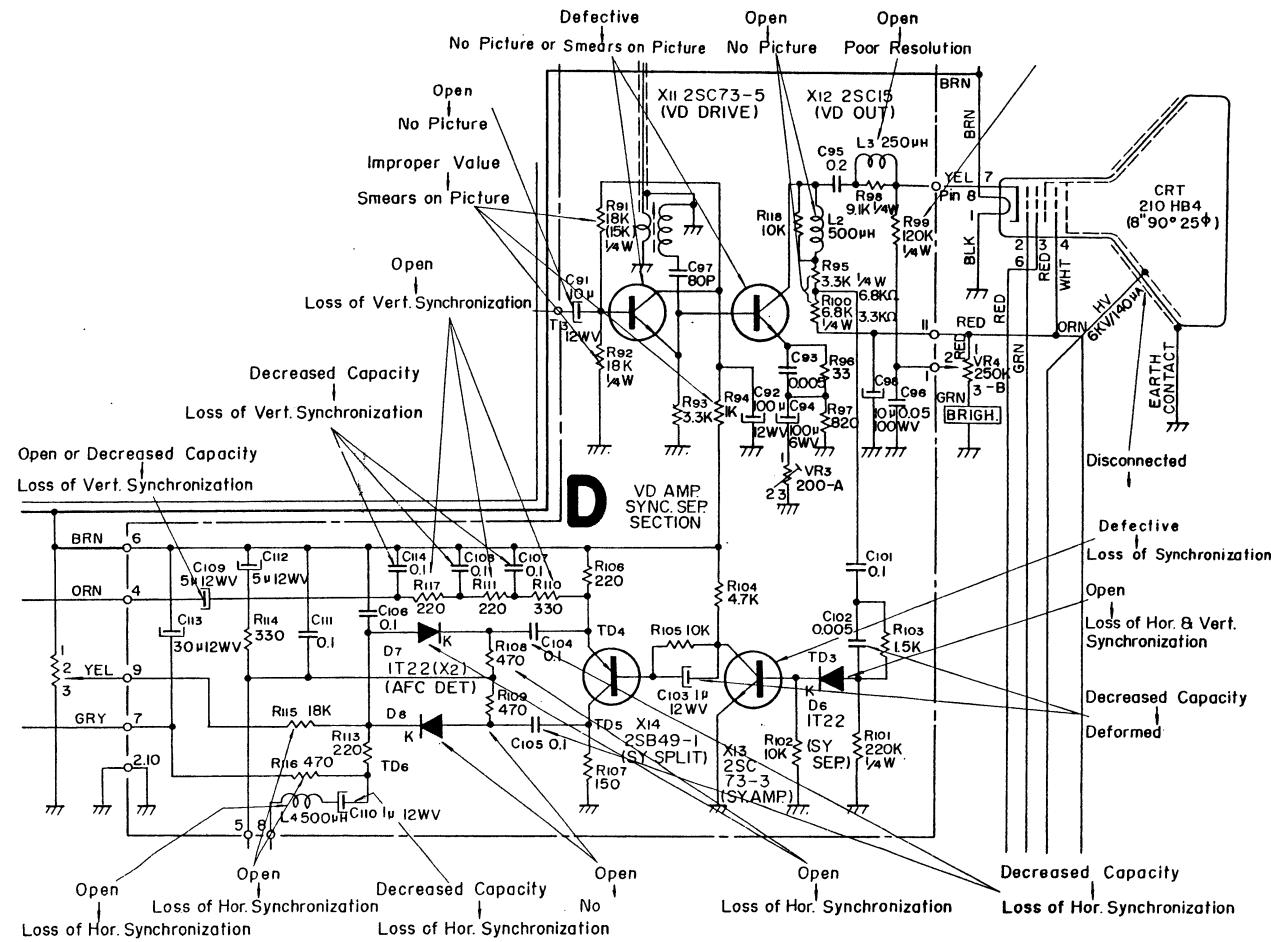
## Trouble Shooting Chart

### —Section C—



## Trouble Shooting Chart

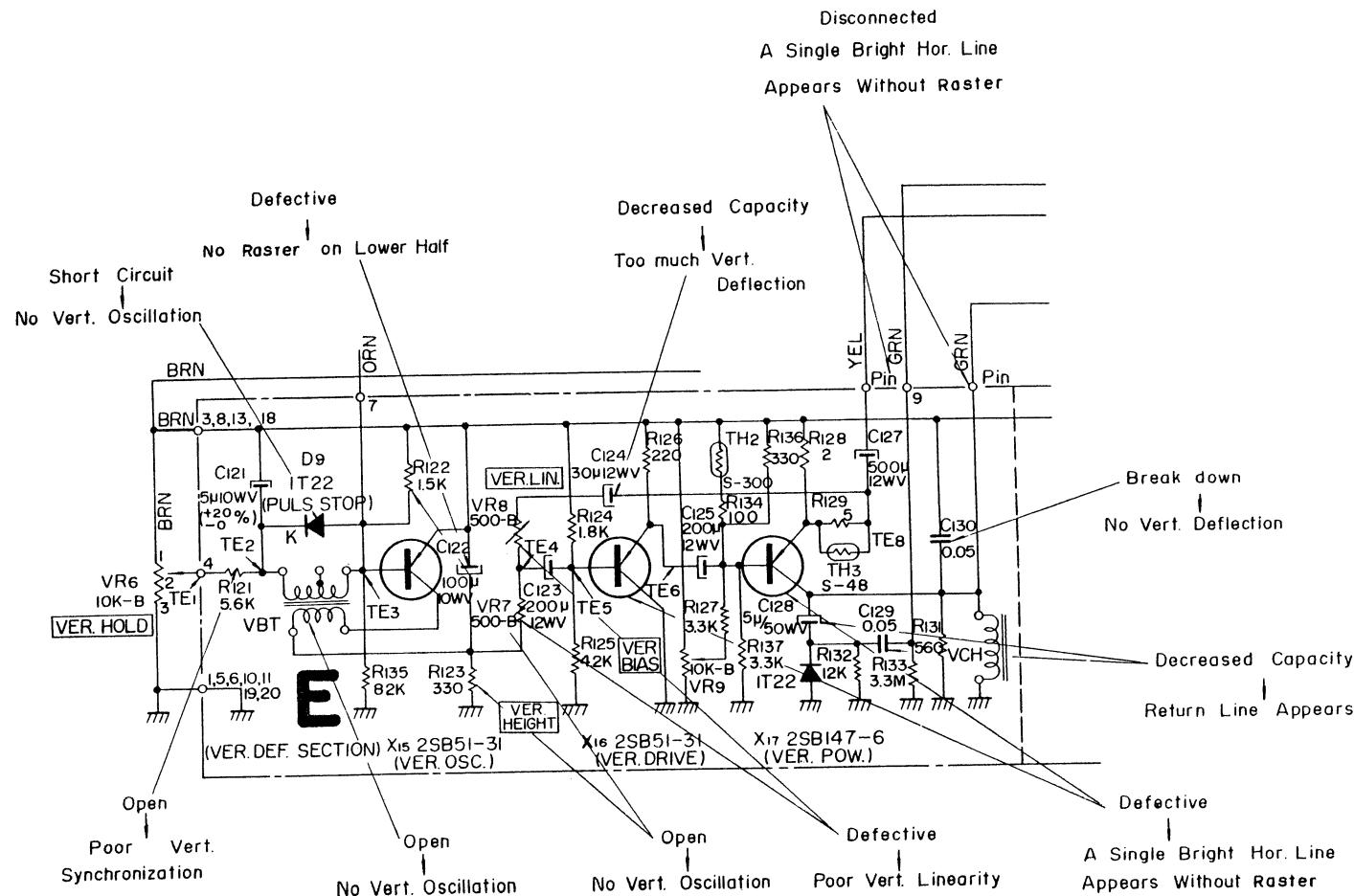
—Section D—



## Trouble Shooting Chart

### —Section E—

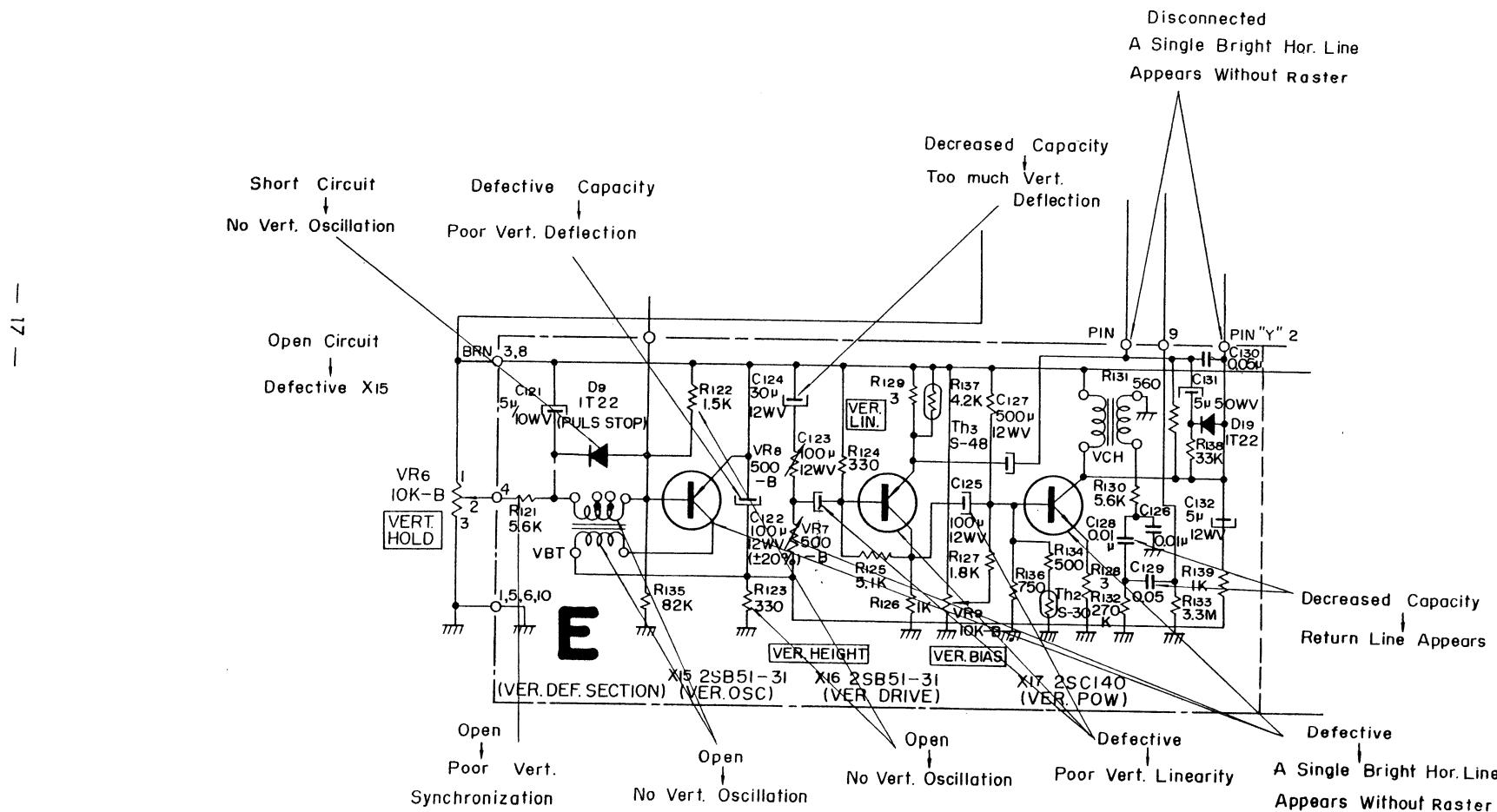
(for 8-301W)



## Trouble Shooting Chart

### —Section E—

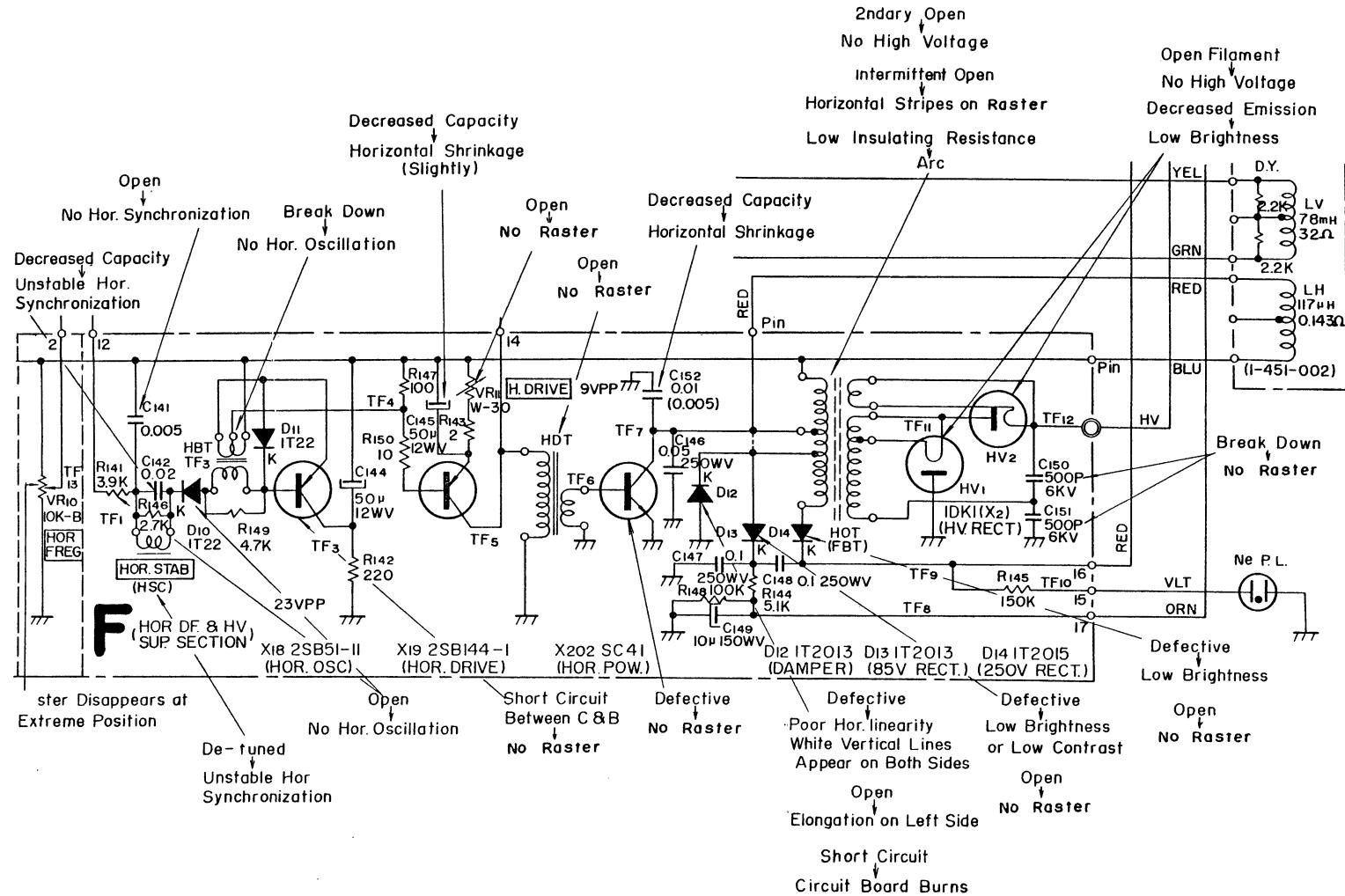
(for 8-301E & T)



## Trouble Shooting Chart

—Section F—

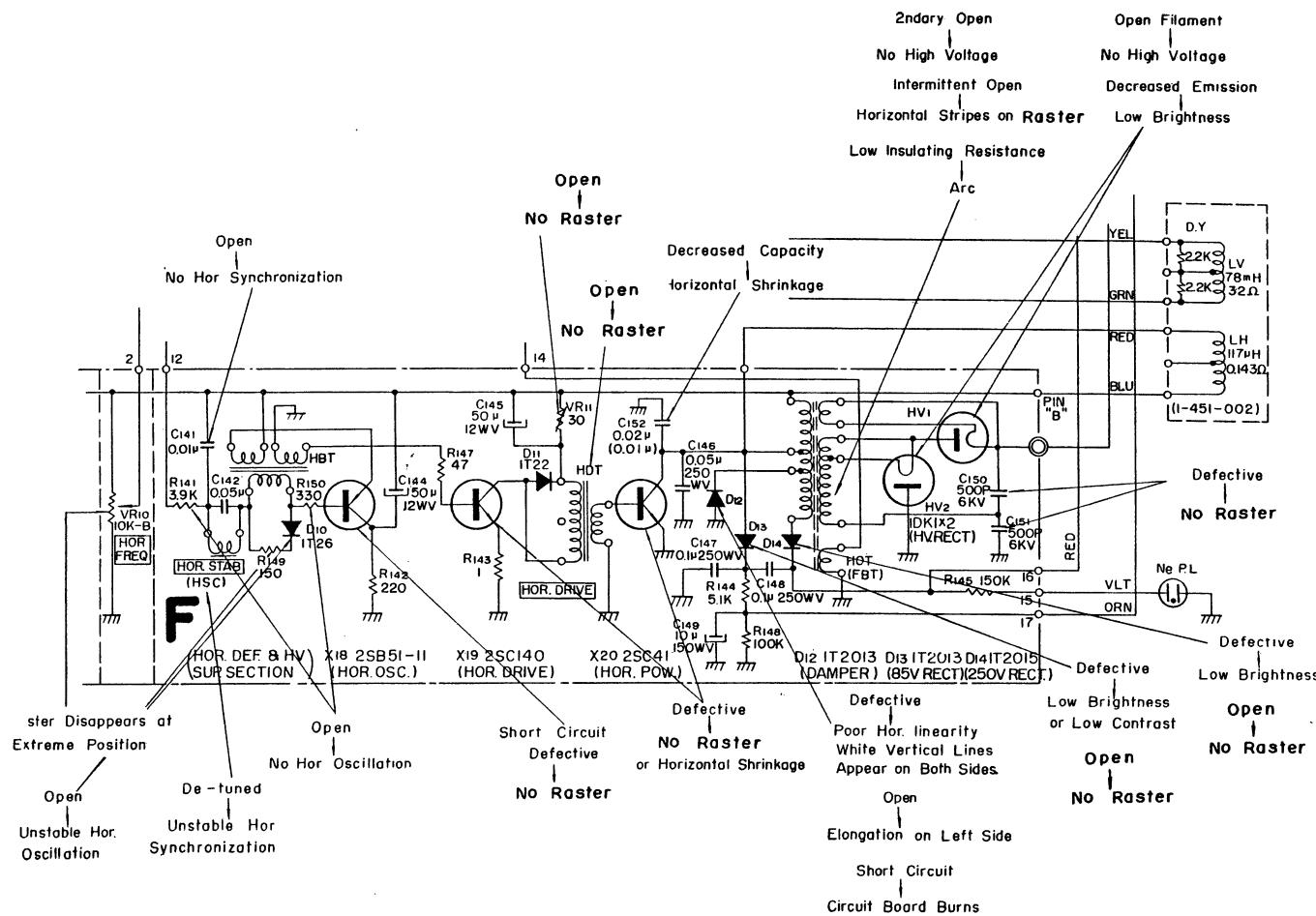
(for 8-301W)



## Trouble Shooting Chart

—Section F—

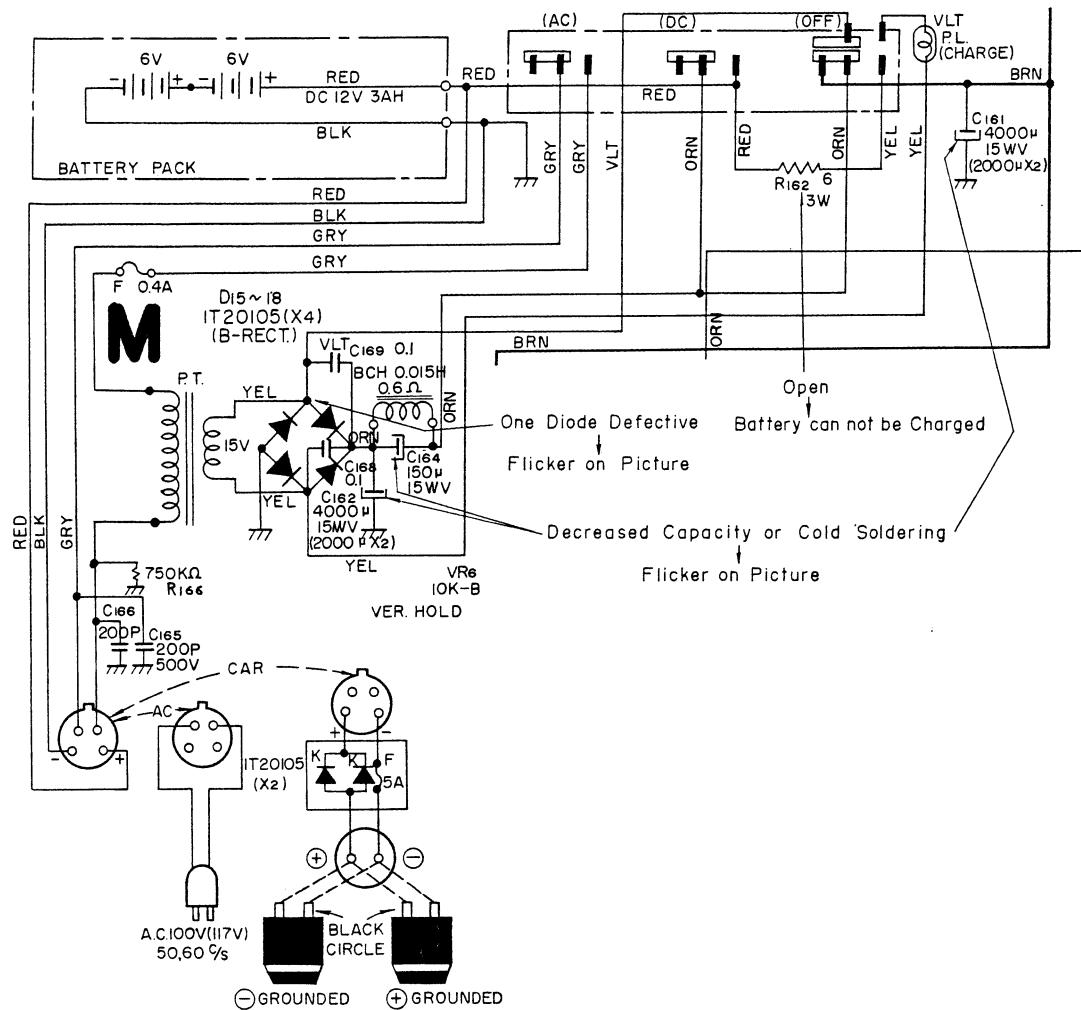
(for 8-301E & T)



## Trouble Shooting Chart

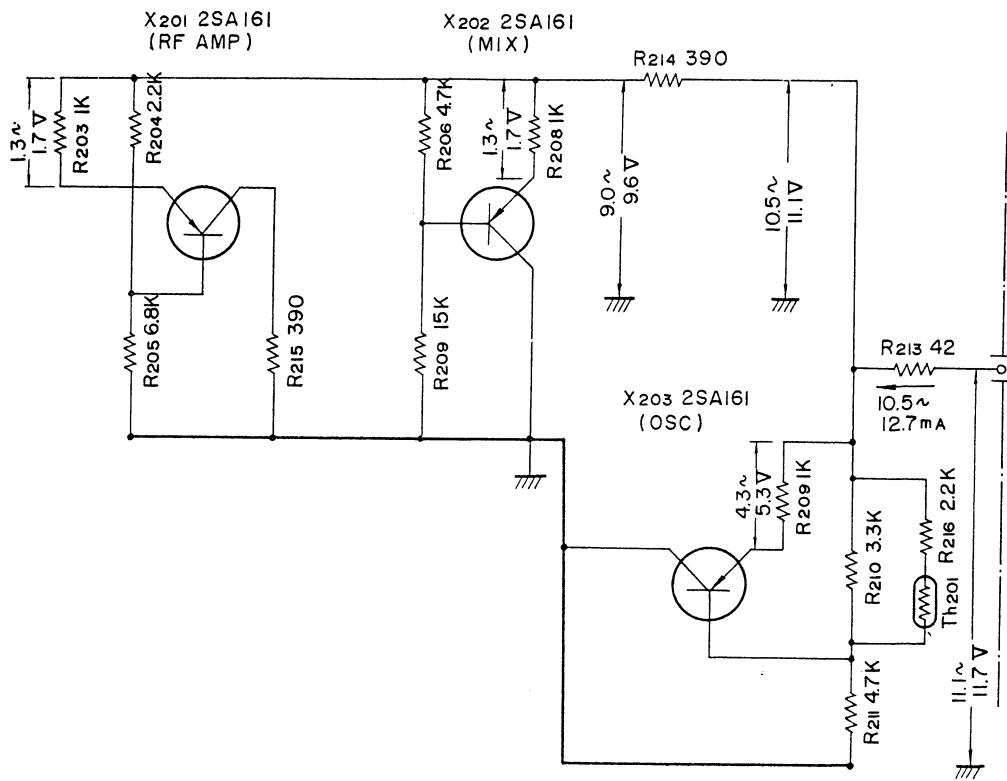
—Section M—

(for 8-301)



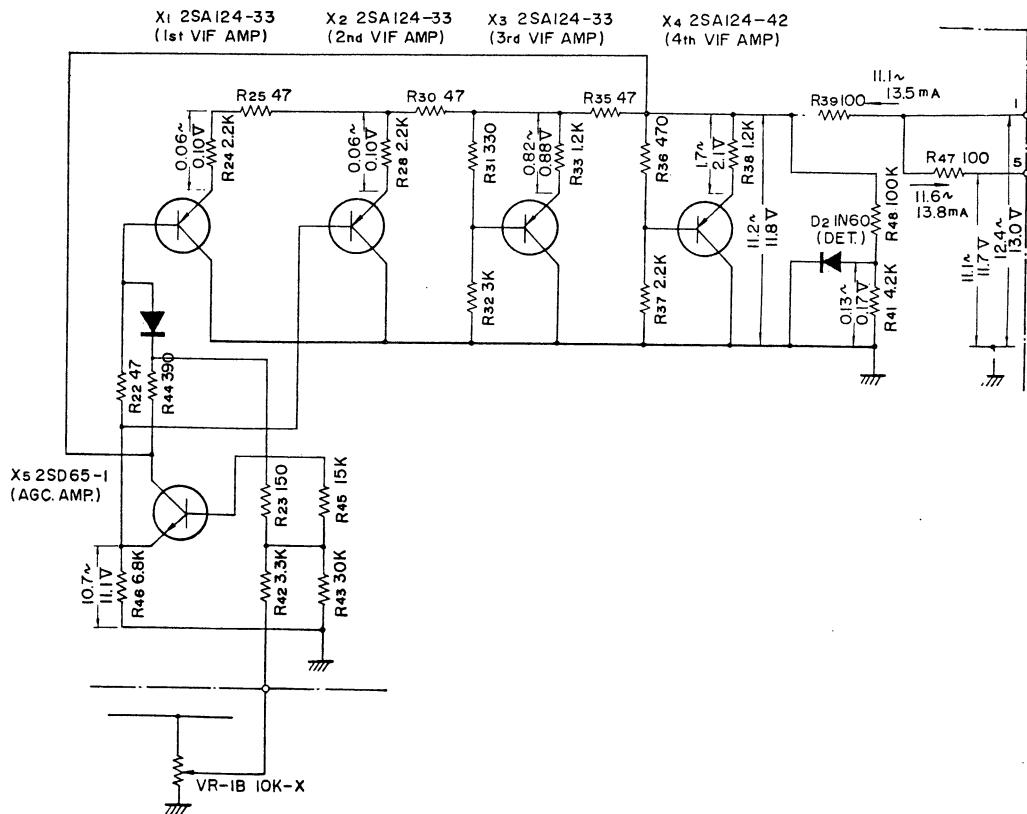
### Voltage and Current Distribution Chart

#### —Section A—



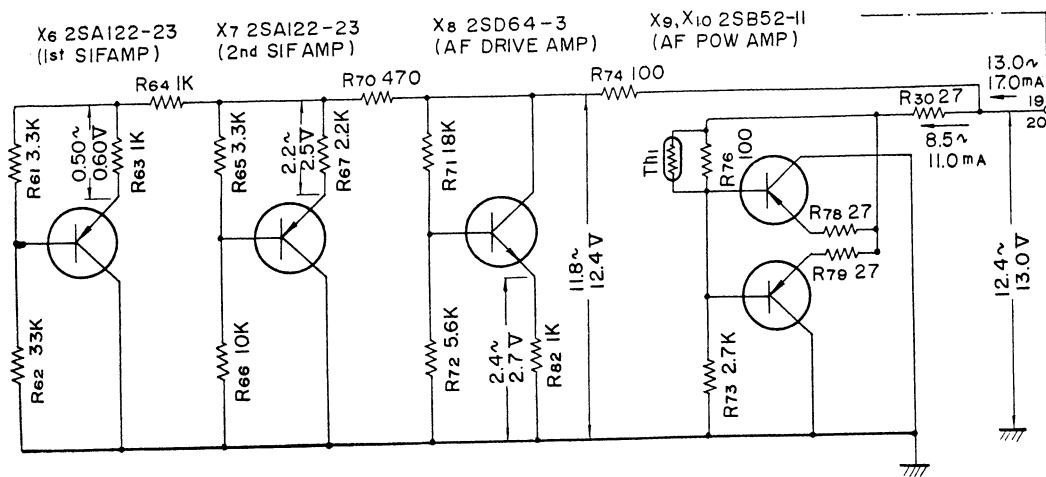
### Voltage and Current Distribution Chart

#### —Section B—



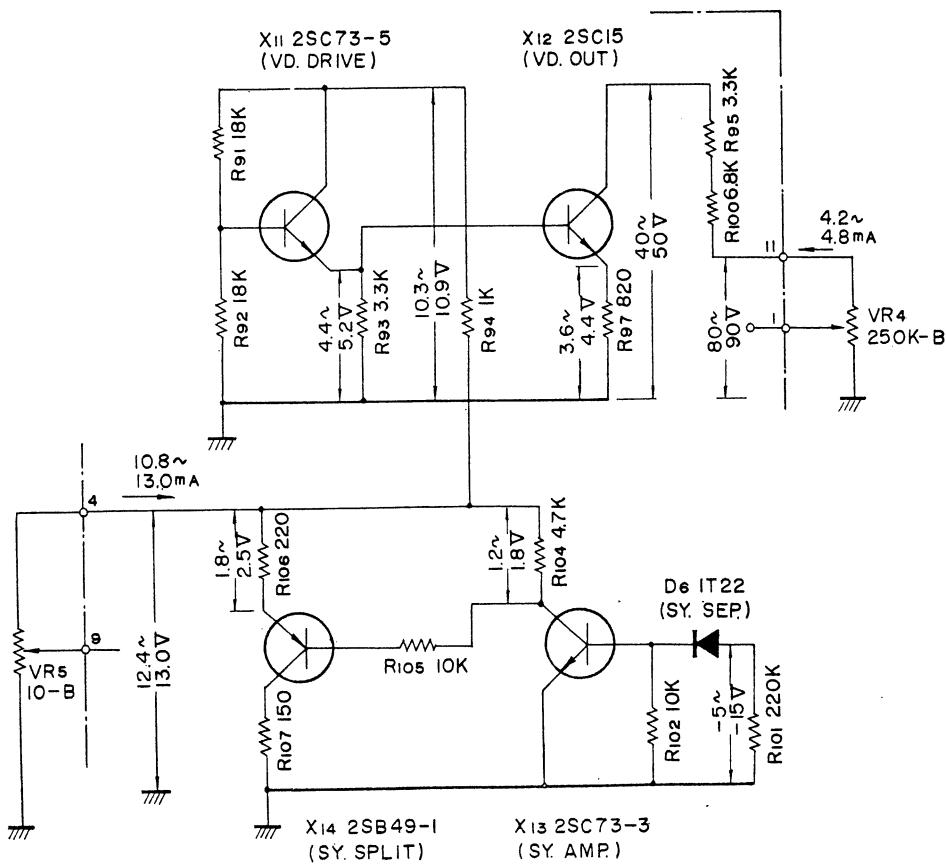
### Voltage and Current Distribution Chart

—Section C—



### Voltage and Current Distribution Chart

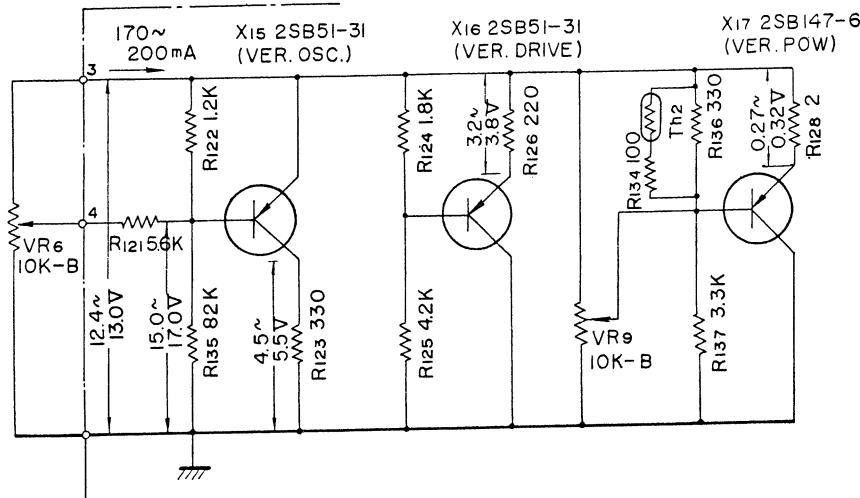
—Section D—



**Voltage and Current Distribution Chart**

—Section E—

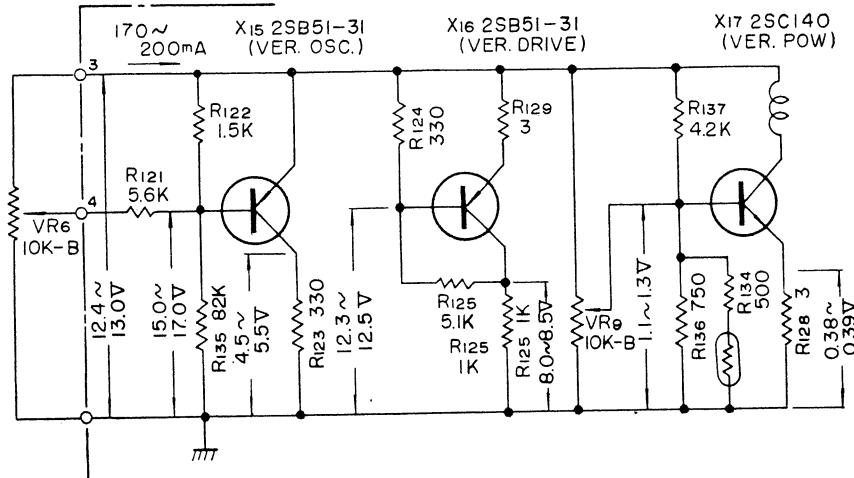
(for 8-301W)



**Voltage and Current Distribution Chart**

—Section E—

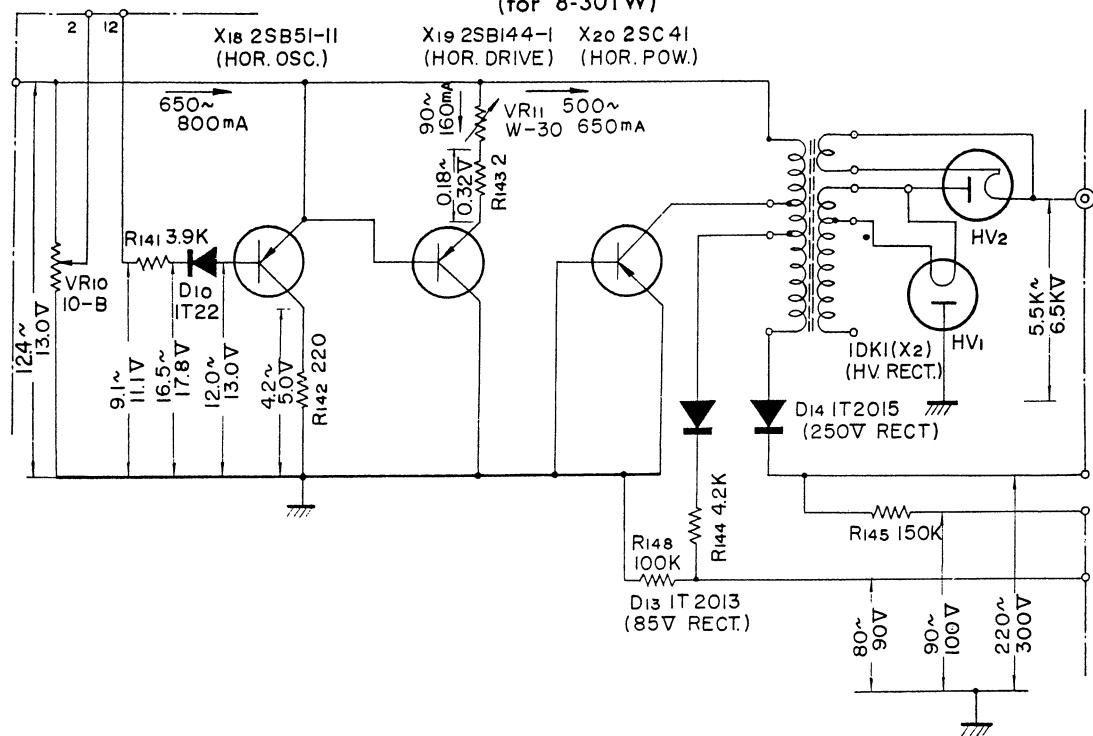
(for 8-301E & T)



### Voltage and Current Distribution Chart

#### —Section F—

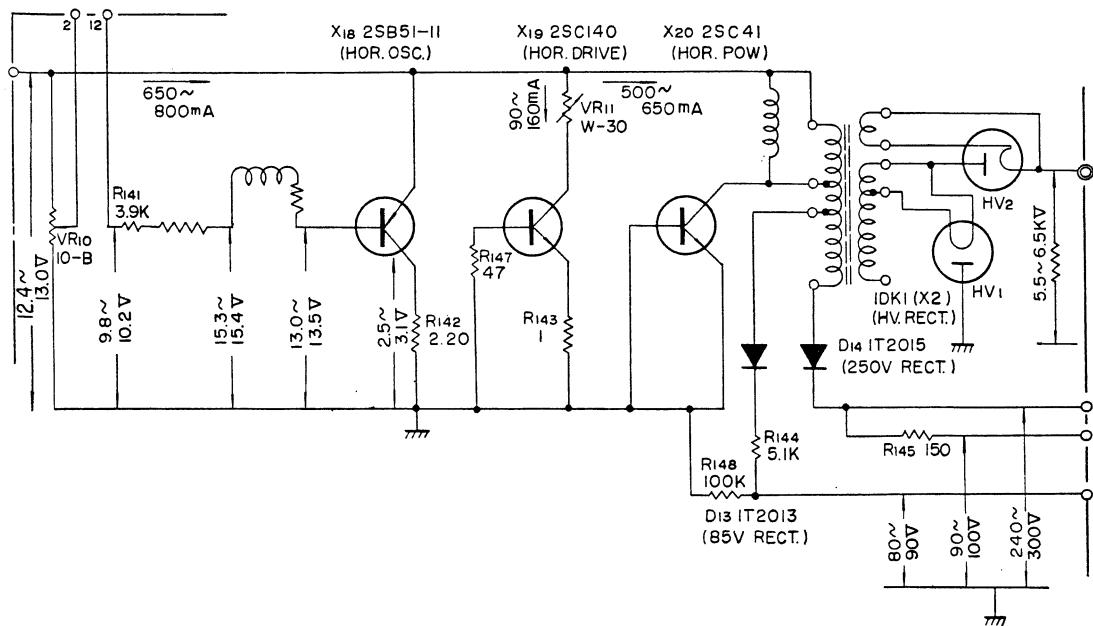
(for 8-301W)



### Voltage and Current Distribution Chart

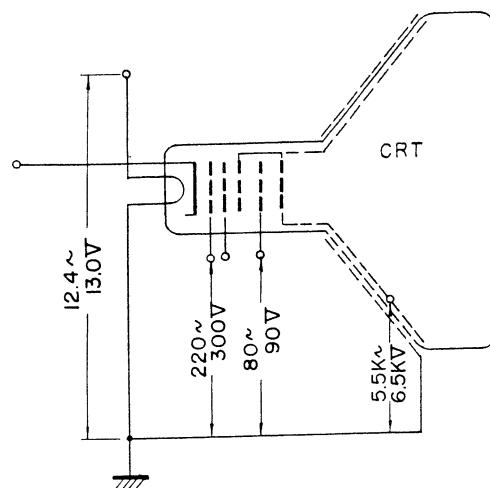
#### —Section F—

(for 8-301E & T)

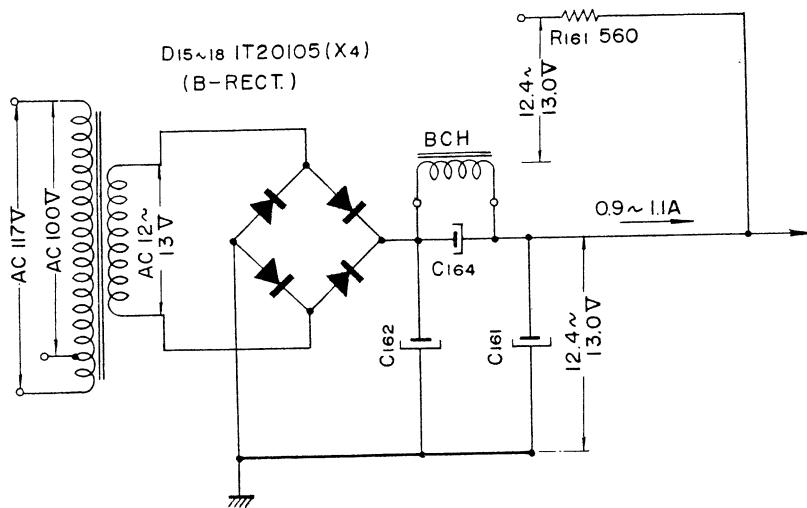


## Voltage and Current Distribution Chart

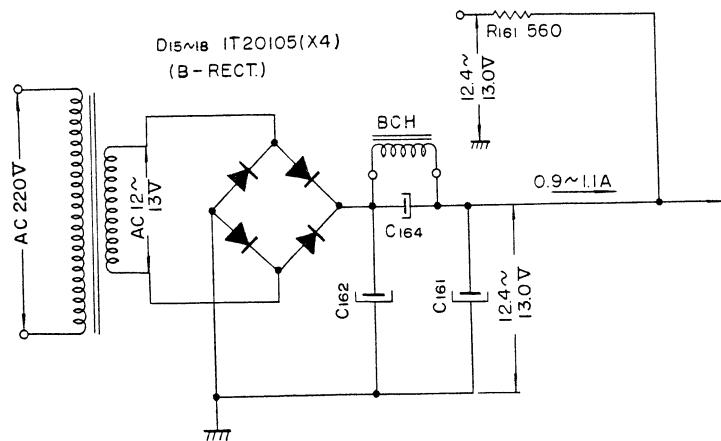
—Section M—



(for 8-301W)

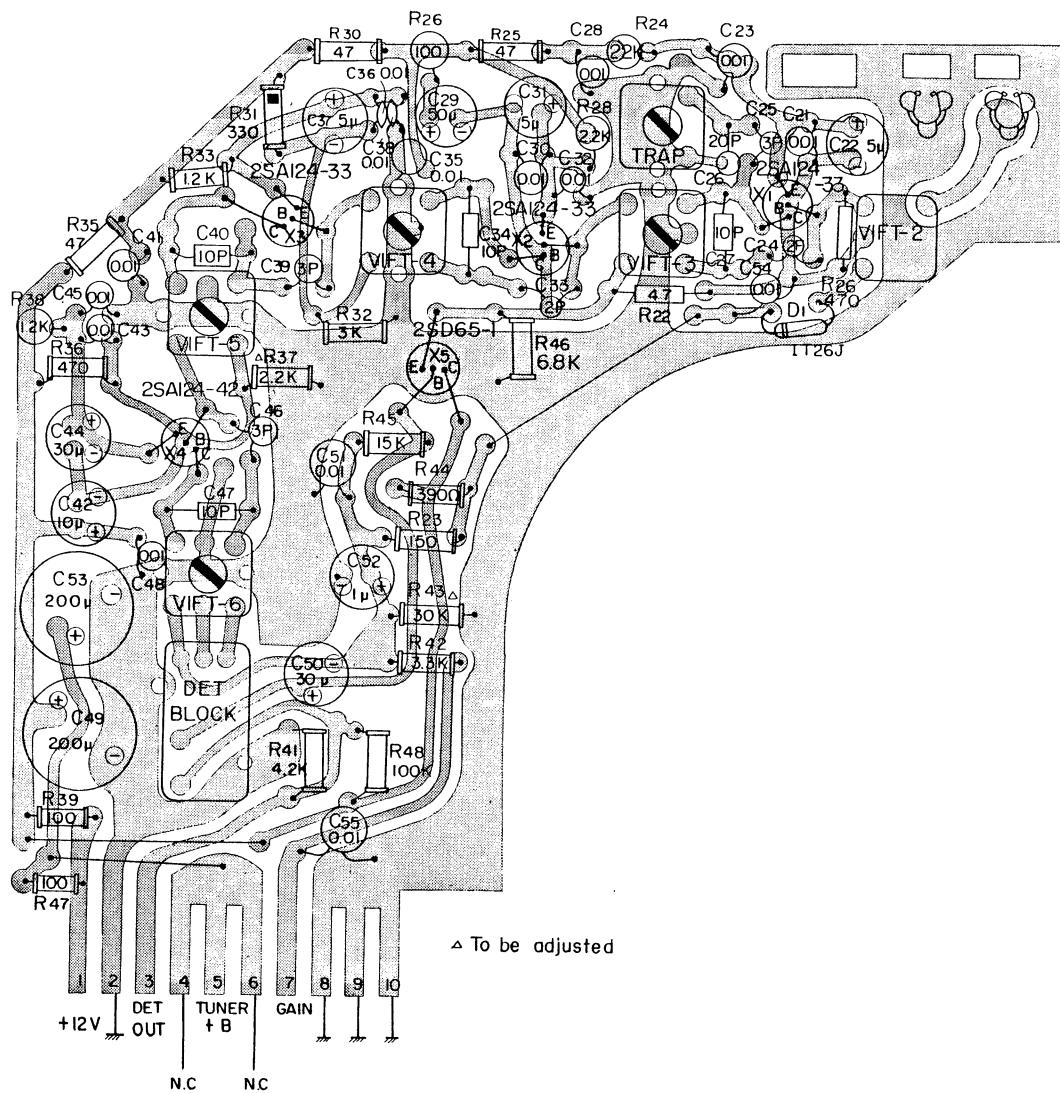


(for 8-301E & T)



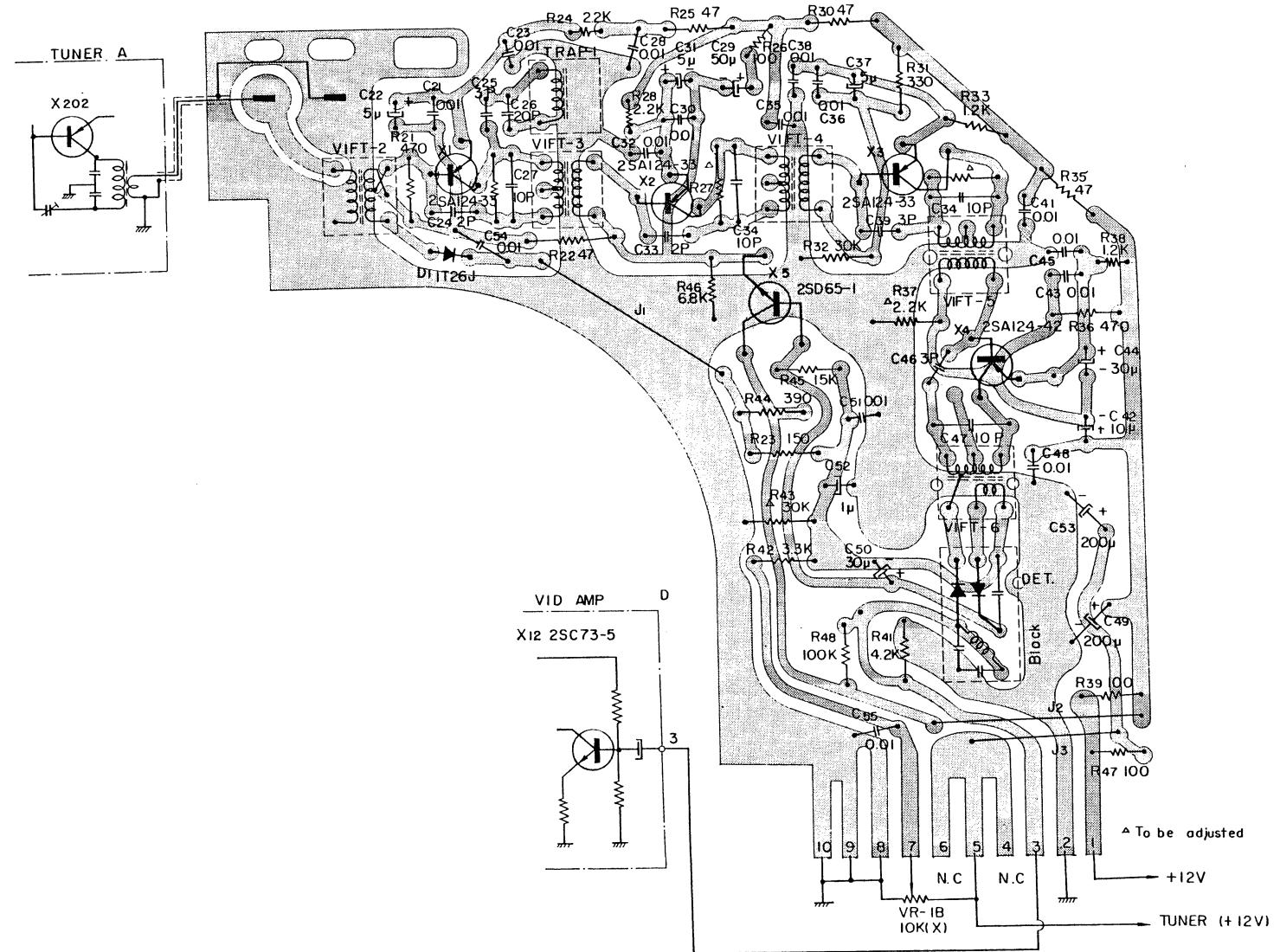
### Mounting Diagram

#### Mounted Side of Section B



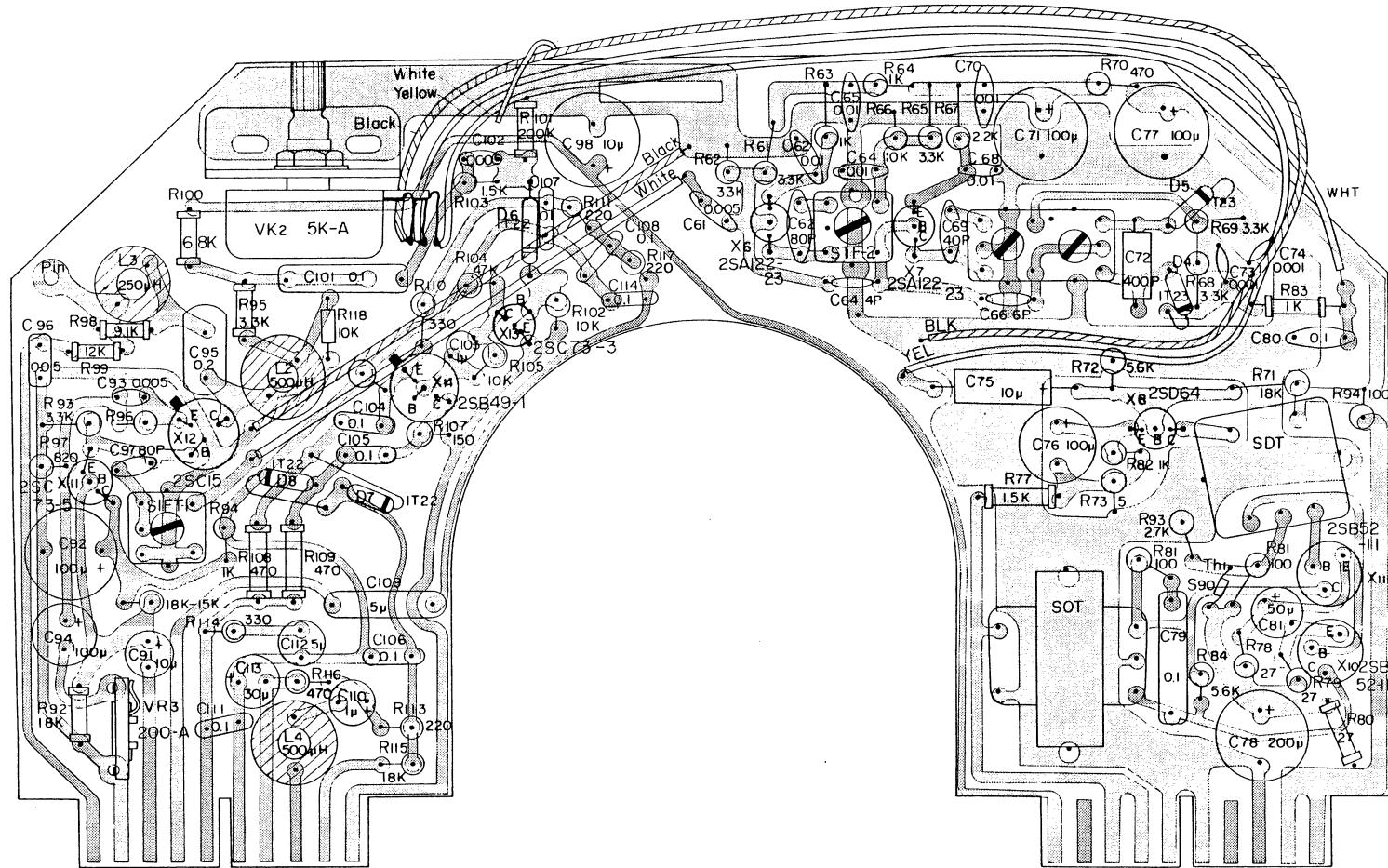
## Mounting Diagram

Printed Side of Section B



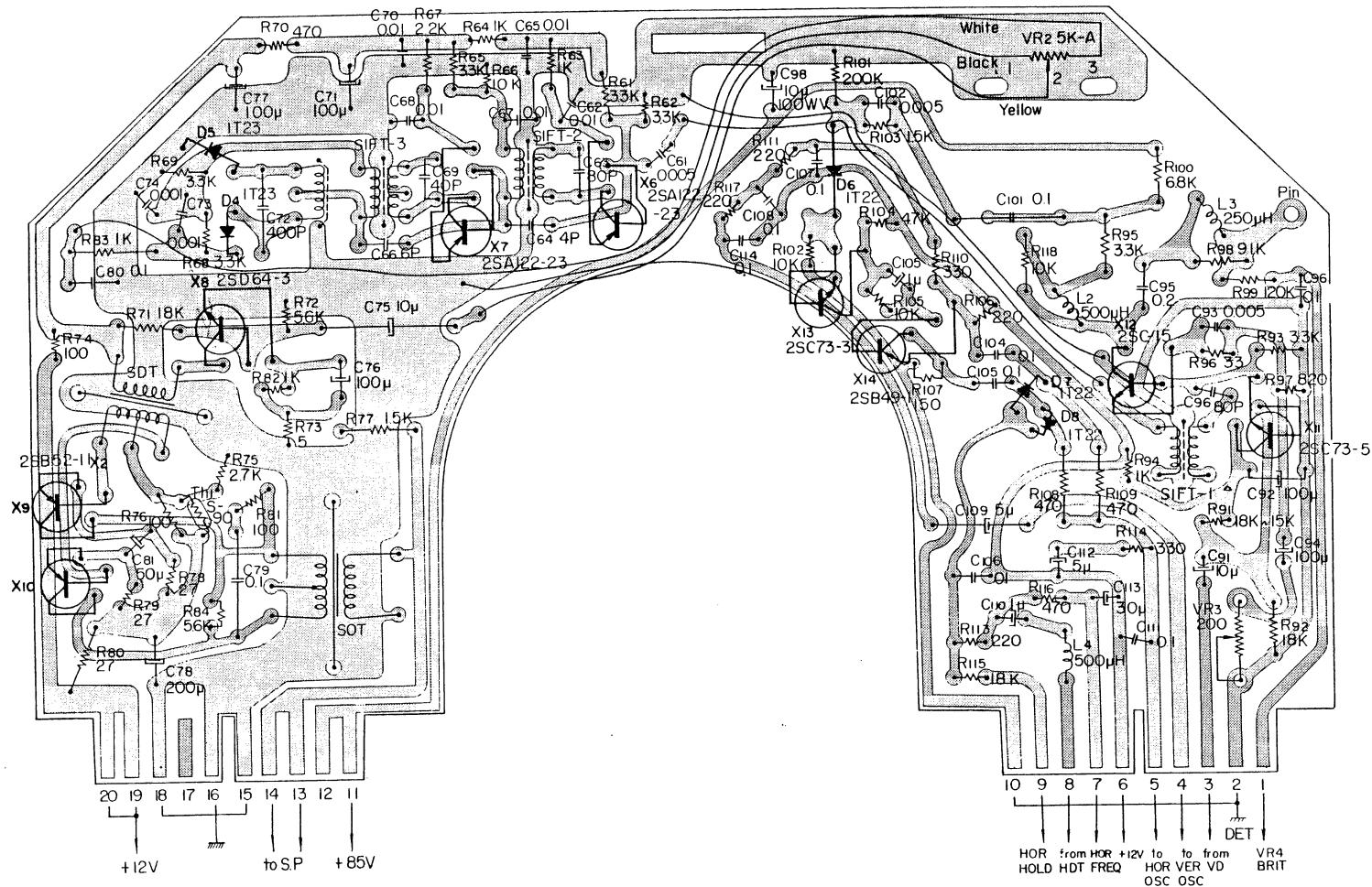
## Mounting Diagram

Mounted Side of Section C and D



## **Mounting Diagram**

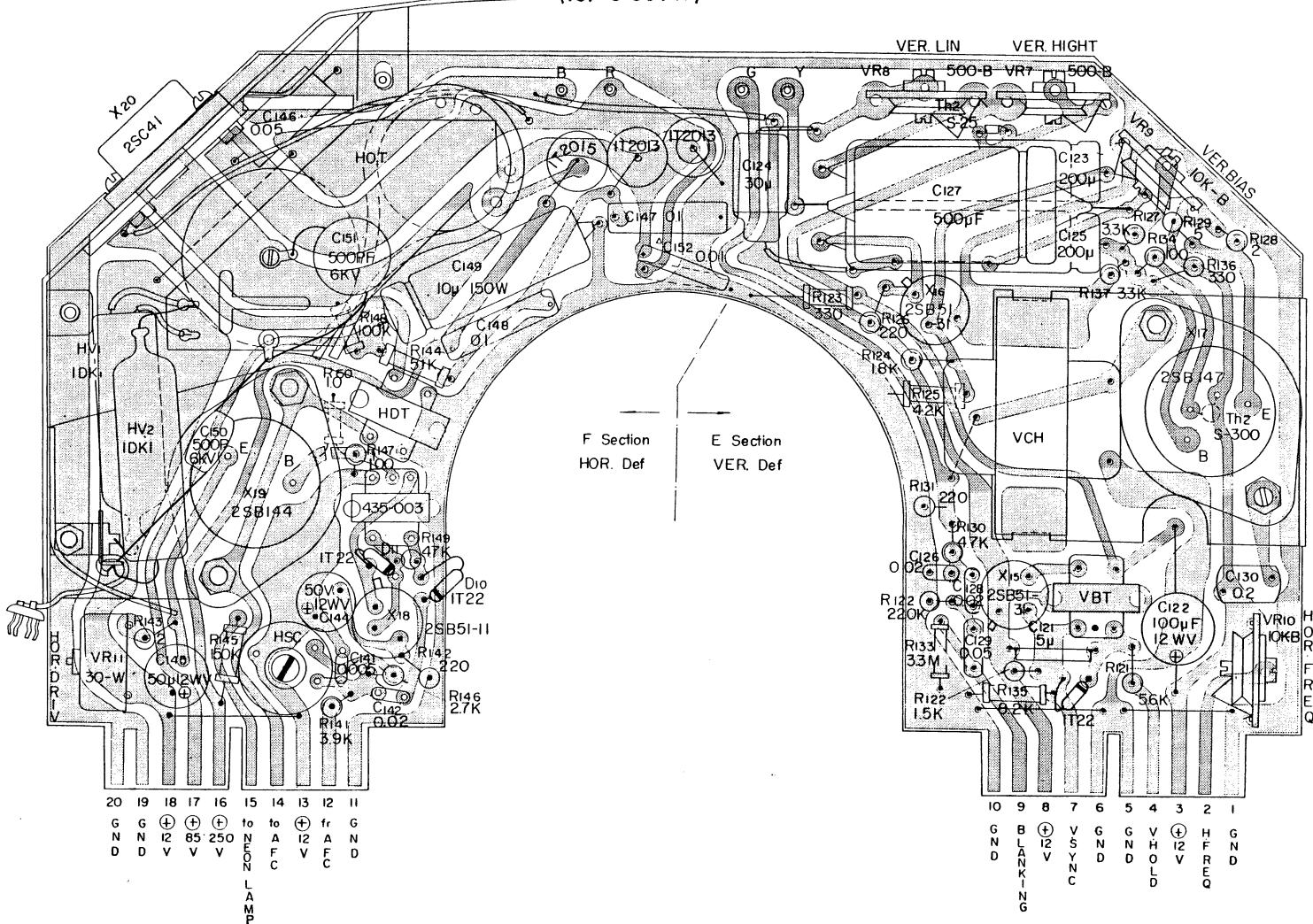
**Printed Side of Section C and D**



## Mounting Diagram

### **Mounted Side of Section E and F**

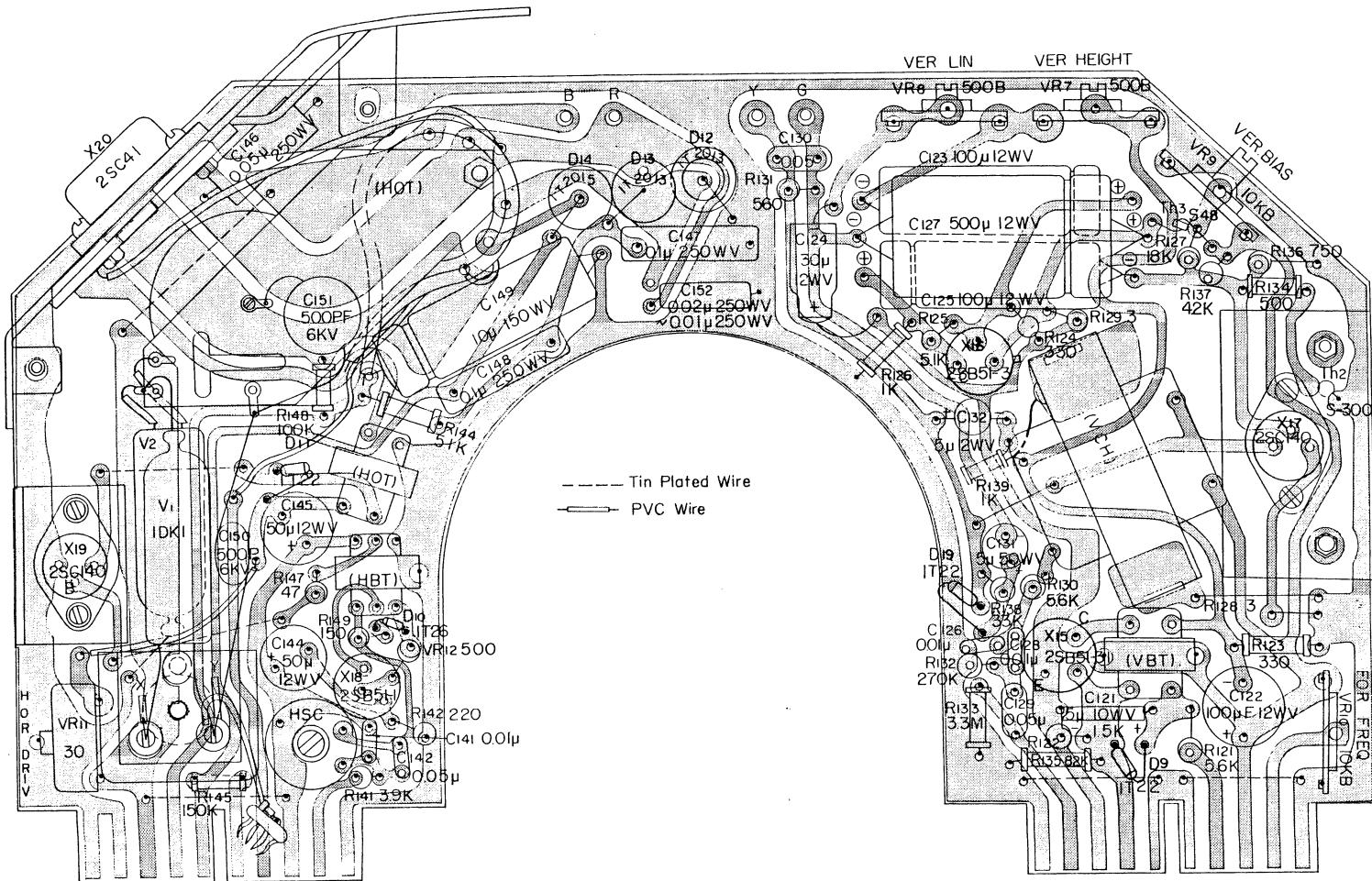
(for 8-301W)



## **Mounting Diagram**

### **Mounted Side of Section E and F**

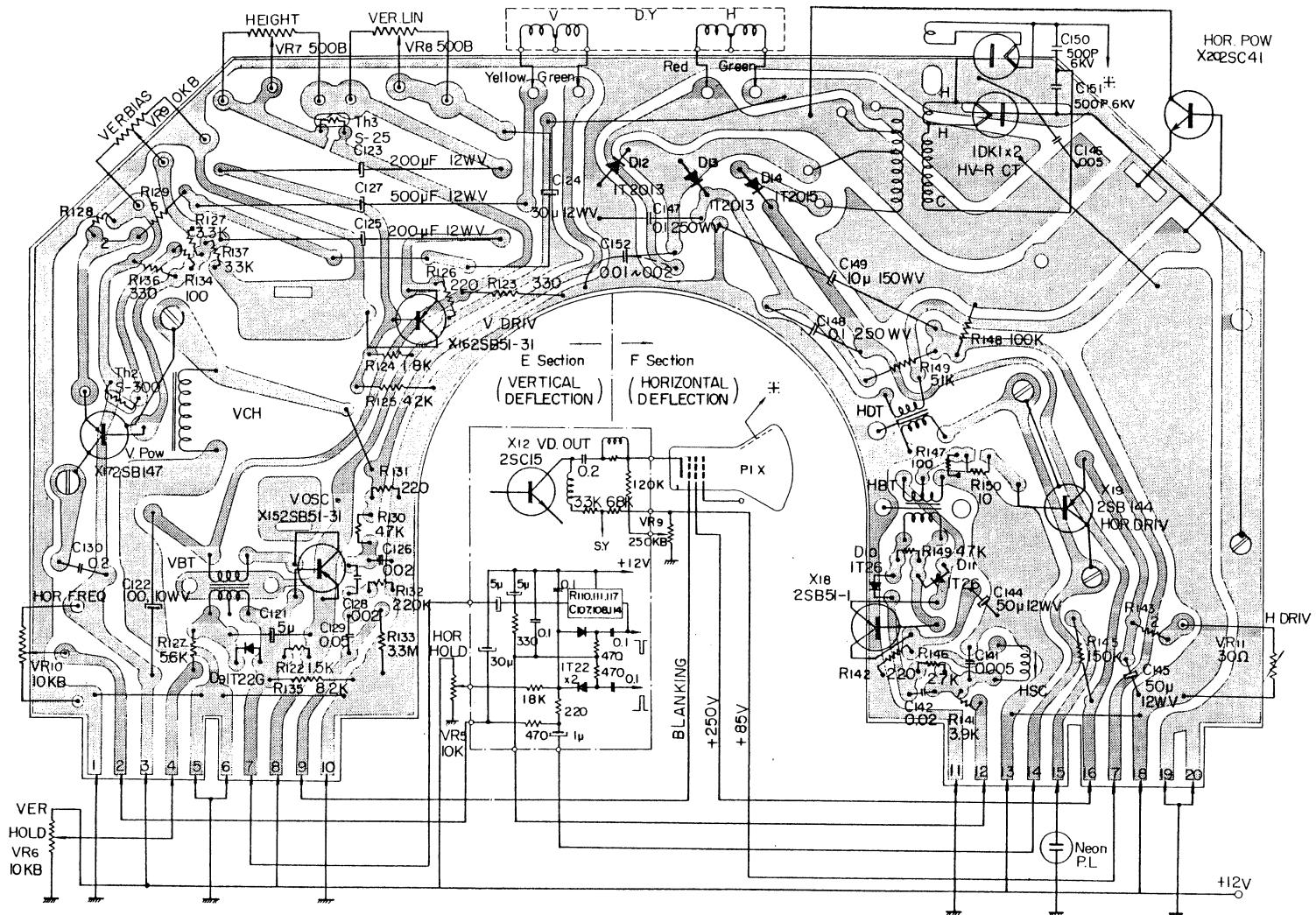
(for 8-301E & T)



## **Mounting Diagram**

**Printed Side of Section E and F**

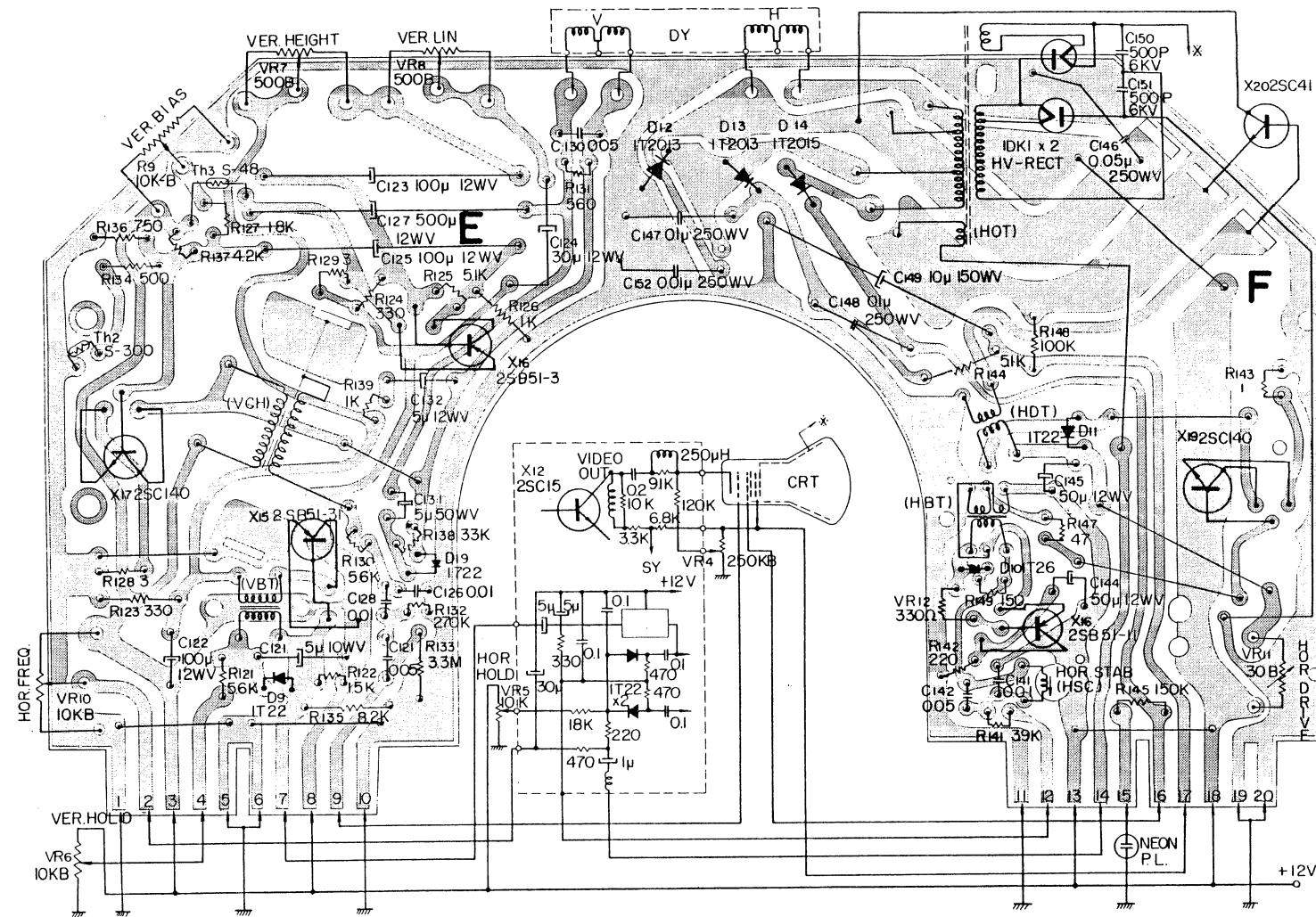
(for 8-301W)



## Mounting Diagram

**Printed Side of Section E and F**

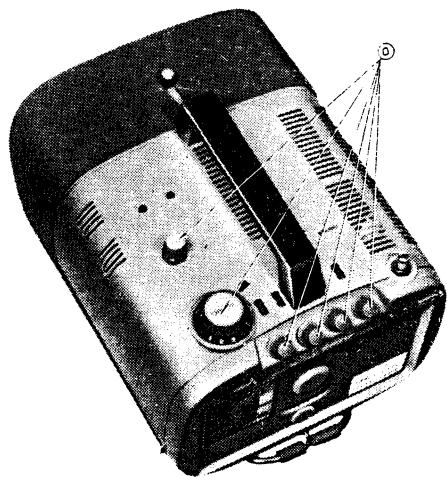
(for 8-301E & T)



## Disassembly Procedure

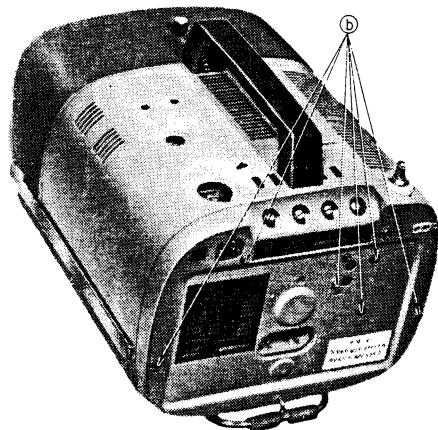
### To Open the Cabinet

- 1) Remove six knobs (a) by pulling up straight.



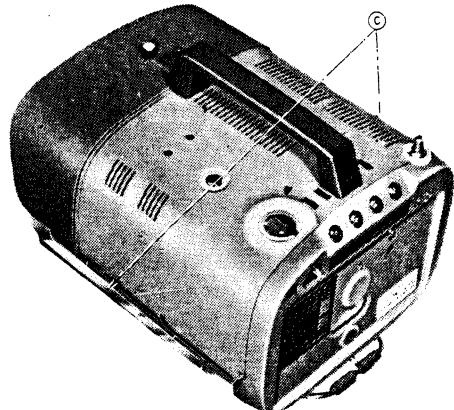
(Fig. A)

- 2) Remove six screws (b).



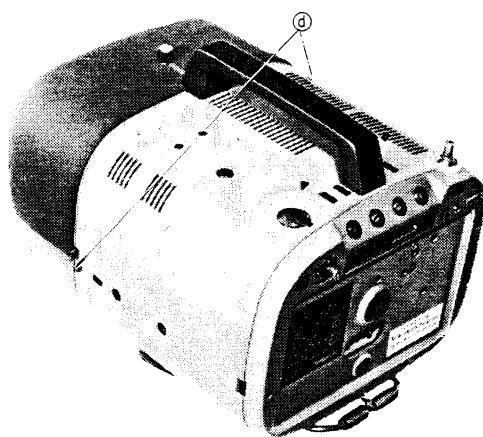
(Fig. B)

- 3) Remove two ornamental strips (c), one each side

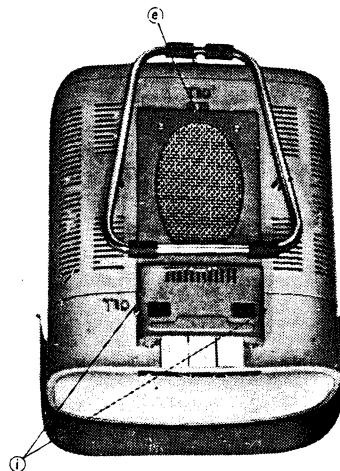


(Fig. C)

4) Remove two screws (d) on both sides (Fig. D), one each side, and one screw (e) on the bottom (Fig. E).

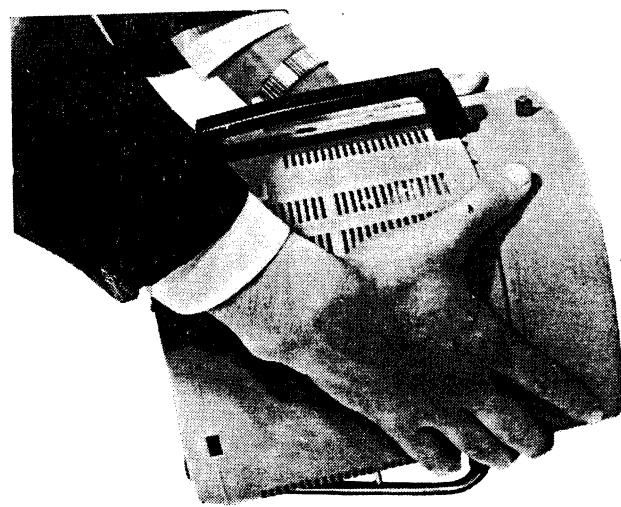


(Fig. D)



(Fig. E)

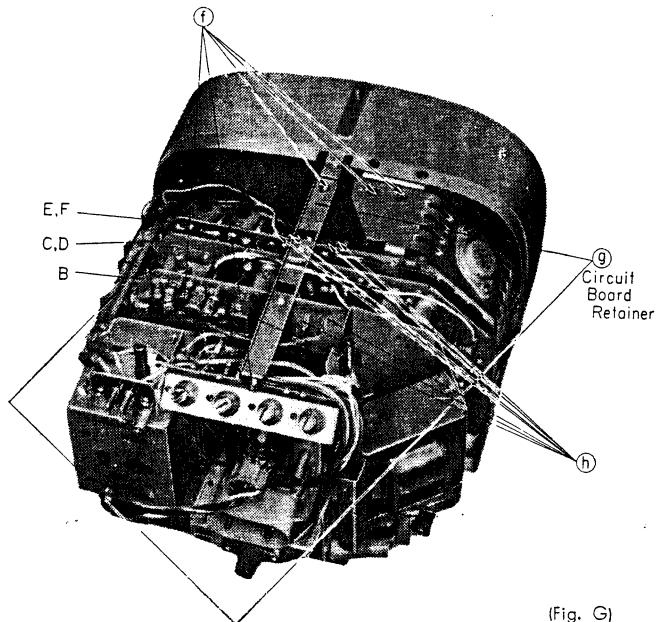
5) Hold both sides of the Back Cover with the hands firmly and push the Front Cover forward. The Back Cover will then be detached.



(Fig. F)

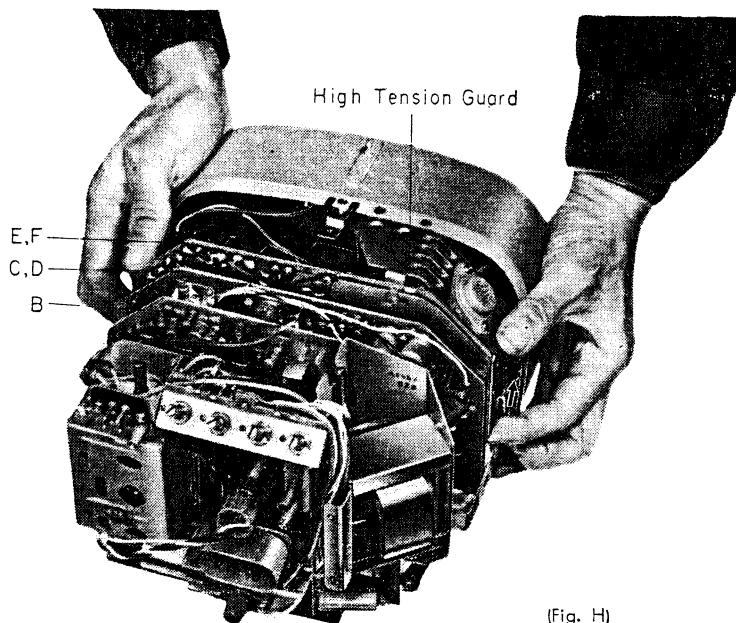
To Take Out the Circuit Boards

- 1) Remove five screws (f) and pull out the circuit board retainers (g). Pull out seven pins, two on the circuit board C, D and four on the circuit board E, F. The circuit boards B, C and D will be dismounted by pulling up straight.



(Fig. G)

- 2) To take out the circuit board E, F, push upward of the lower end of the high tension guard as shown in Fig. H.

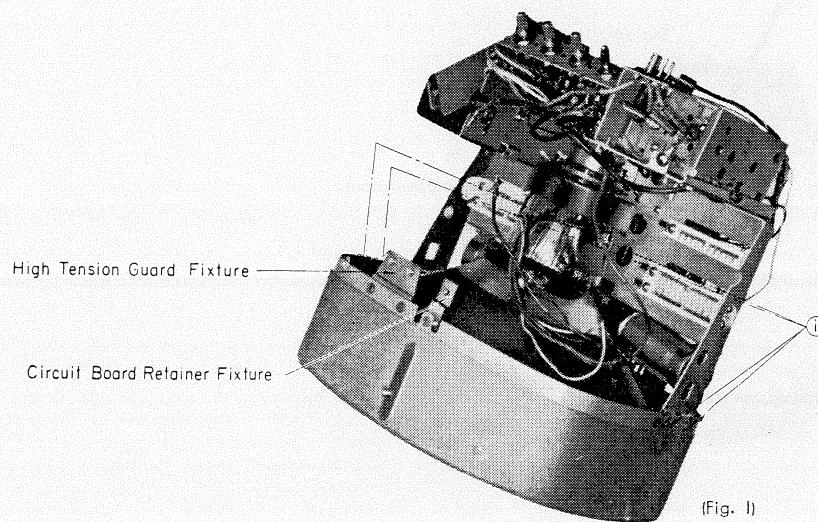


(Fig. H)

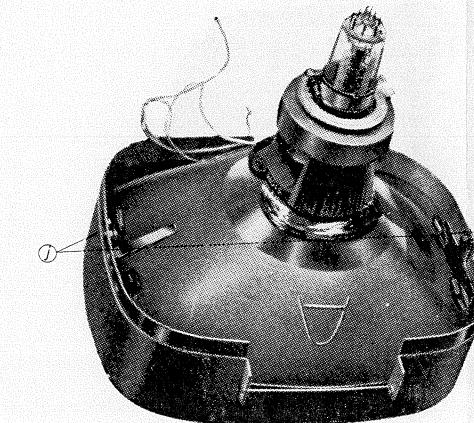
Remove the anode connector for the picture tube behind the high tension guard.

To Remove the Picture Tube

- 1) Remove the circuit board retainer fixture and high tension guard fixture.
- 2) Remove the picture tube socket.
- 3) Remove six screws (i), four on both sides of the front frame and two on the bottom (Fig. E), and disengage the chassis and the front frame (Fig. I).

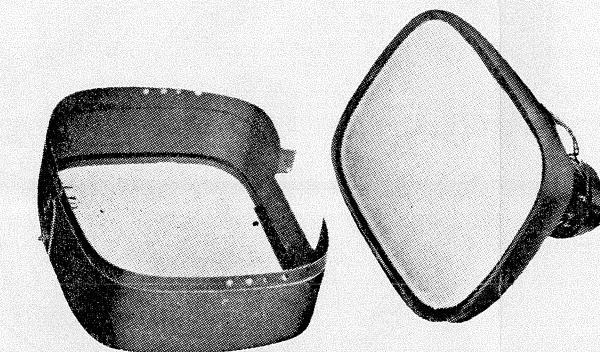
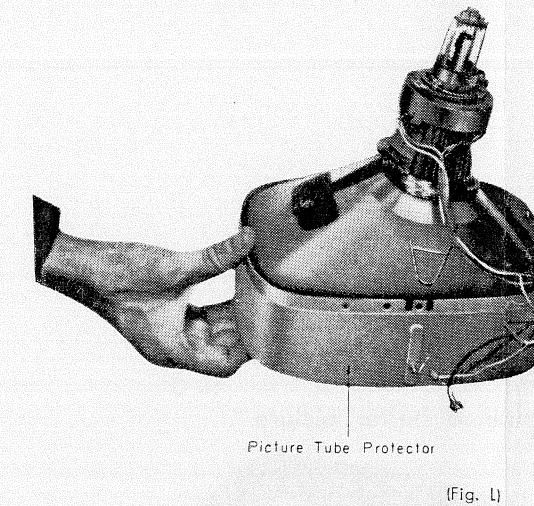
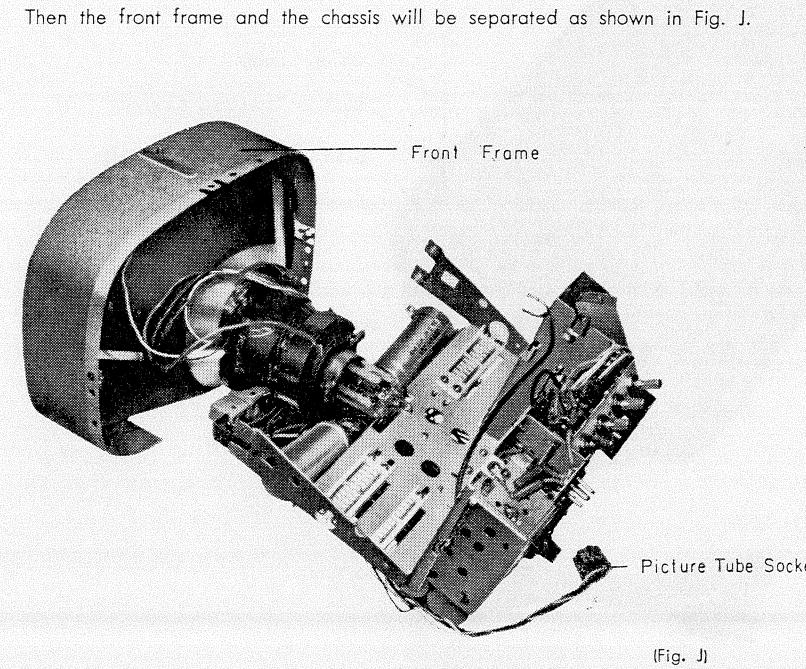


- 4) Remove two screws (J) to dismount two picture tube retainers.

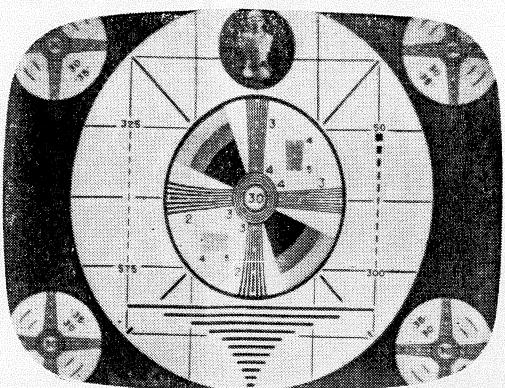


(Fig. K)

- 5) Push the picture tube protector as shown in Fig. L, and the tube will be removed from the front frame (Fig. M)



**Properly Adjusted Picture**



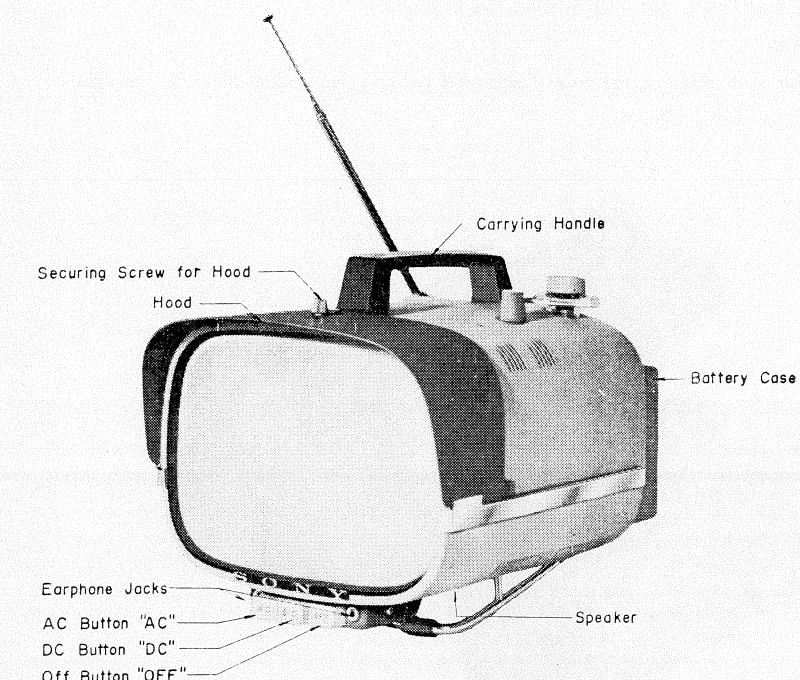
Vertical Resolution

Approx. 400 lines

Horizontal Resolution

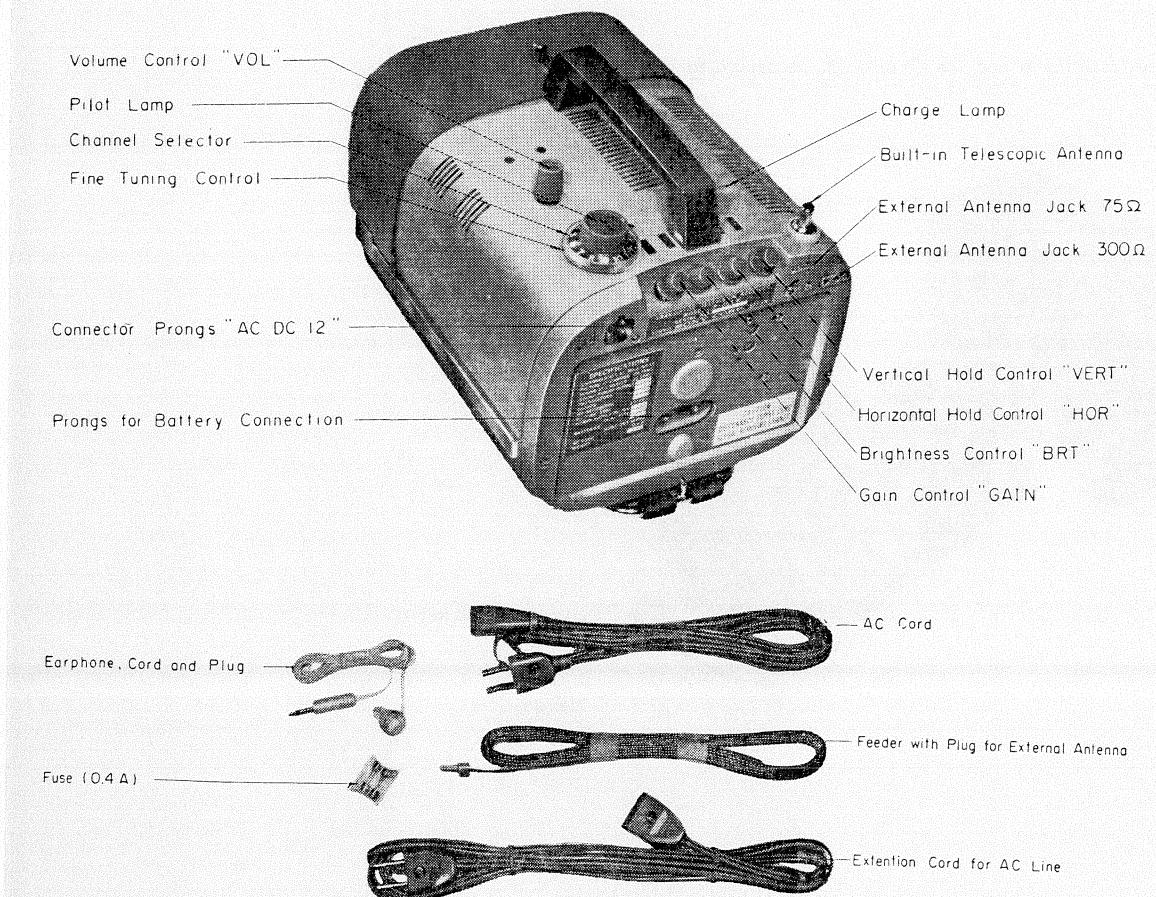
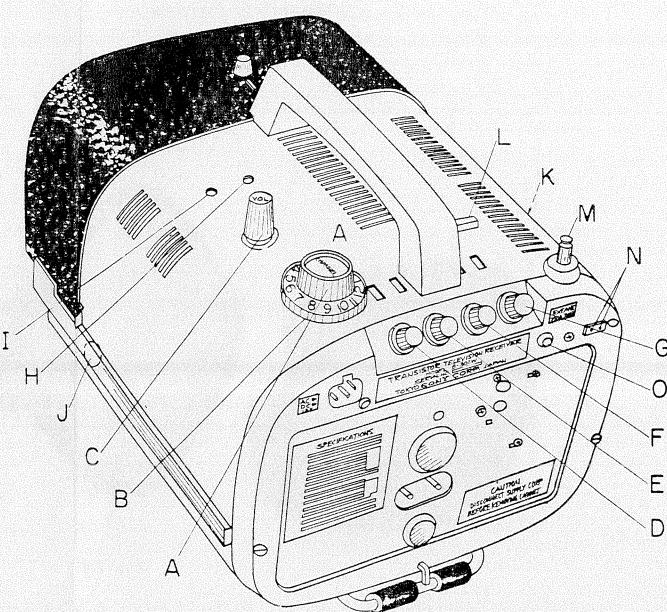
Approx. 400 lines

Adjust (H), and (I) to obtain circle on the test pattern.



**Reference Drawing for  
"How to obtain a better picture"**

- A "CHANNEL" Channel Selector
- B Fine Tuning Control
- C "VOL" Volume Control
- D "GAIN" Gain Control
- E "BRT" Brightness Control
- F "HOR" Horizontal Hold Control
- G "VER" Vertical Hold Control
- H Vertical Linearity Control
- I Height Control
- J Horizontal Sweep Frequency Control
- K Horizontal Drive Control
- L Charge Lamp
- M Built-in Telescopic Antenna
- N External Antenna Jack 300Ω
- O External Antenna Jack 75Ω



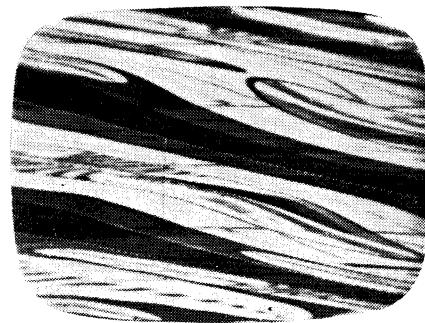
## How to obtain better picture

(Unfold page 39 for drawing and refer)



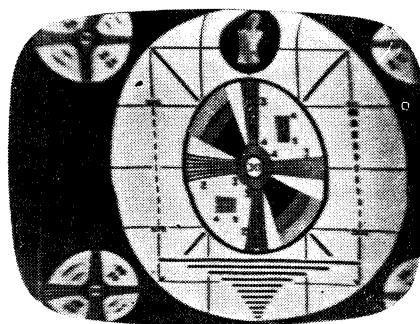
### 1. Loss of Horizontal Synchronization

Turn "HOR" Knob (F) clockwise.



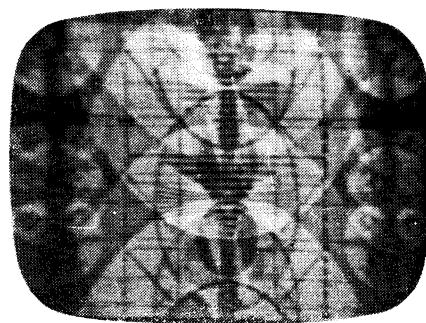
### 2. Loss of Horizontal Synchronization

Turn "HOR" Knob (F) counterclockwise.



### 3. Dislocated Picture—Loss of Horizontal Synchronization

Turn "HOT" Knob (F) clockwise or counterclockwise.

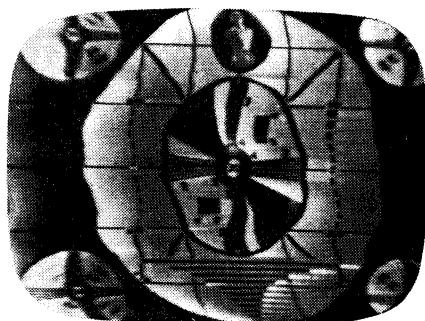
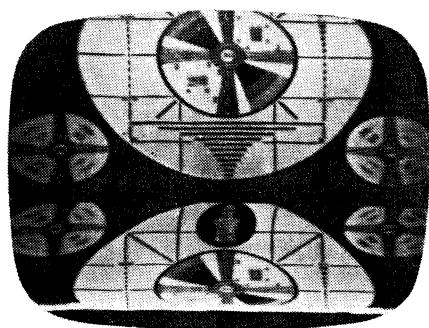


### 4. Overlapped Picture—Loss of Vertical Synchronization

Turn "VERT" Knob (G) counterclockwise.

5. Double Frame—Loss of Vertical Synchronization

Turn " VERT " Knob (G) clockwise.

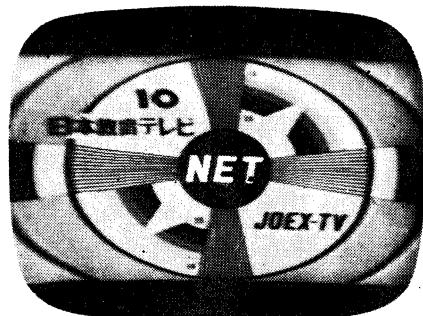
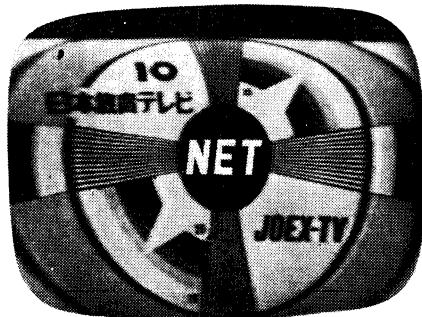


6. Zig-zag Picture with High Contrast—Excessive Input

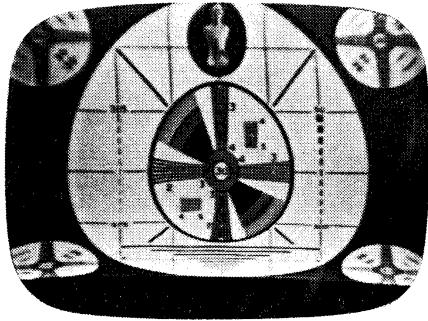
Turn " GAIN " Knob (D) counterclockwise.

7. Vertical Shrinkage—Insufficient Vertical Amplitude

Adjust (I).



8. Shrinkage on the Top—Poor Vertical Linearity  
Adjust (H).



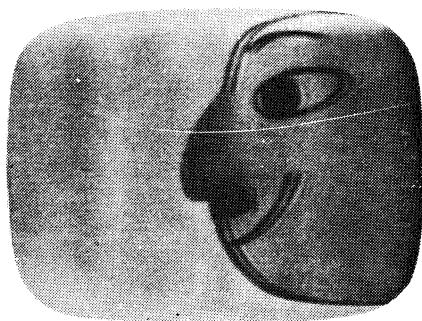
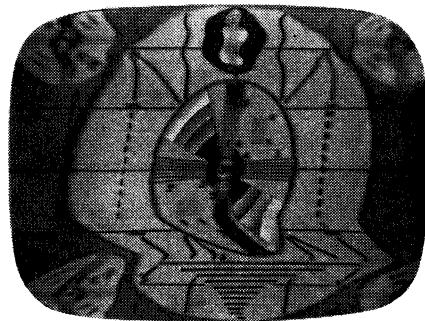
9. Shrinkage on the Bottom—Poor Vertical

Linearity

Adjust (H).

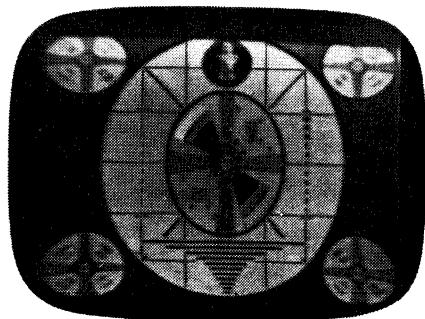
10. Deformed or Zig-zag Picture, sometimes with Horizontal Stripes appear along with the sound.

Adjust (B).



12. Contracted Picture Size with washed out appearance—drop of Battery Voltage

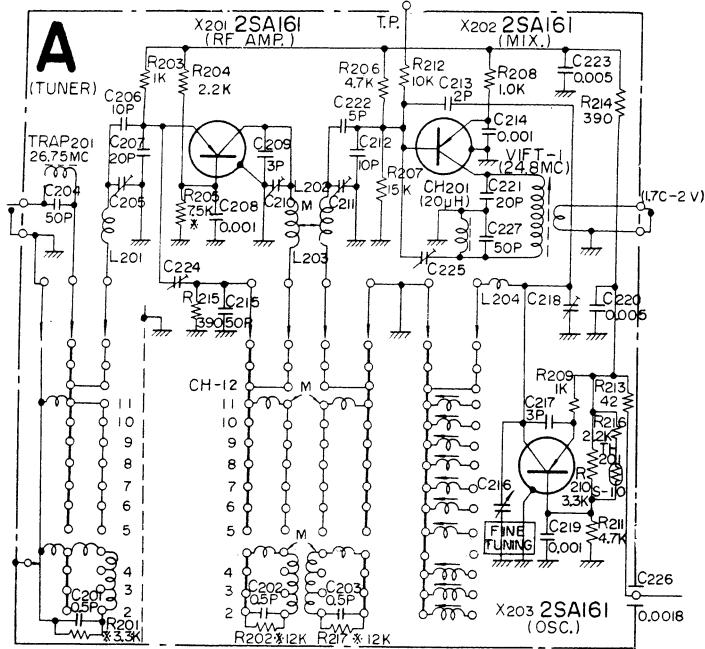
Recharge the battery.



## Schematic Diagram

—Section A—

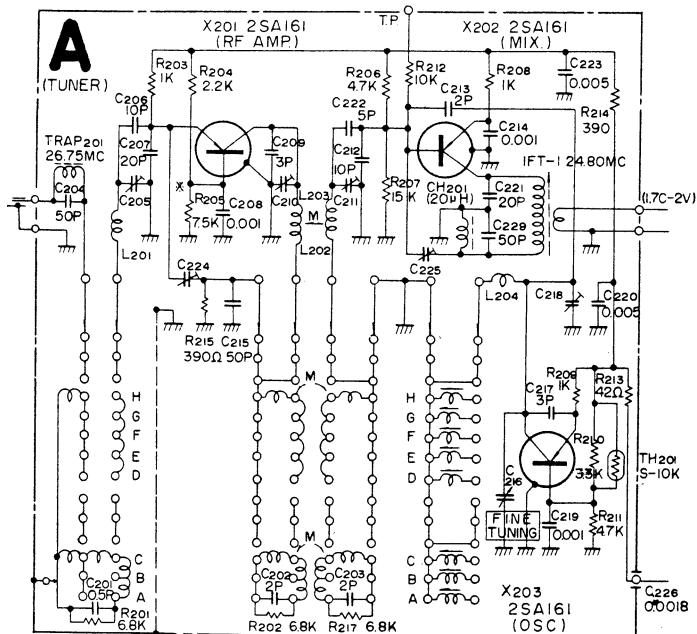
(for 8-301E)



## Schematic Diagram

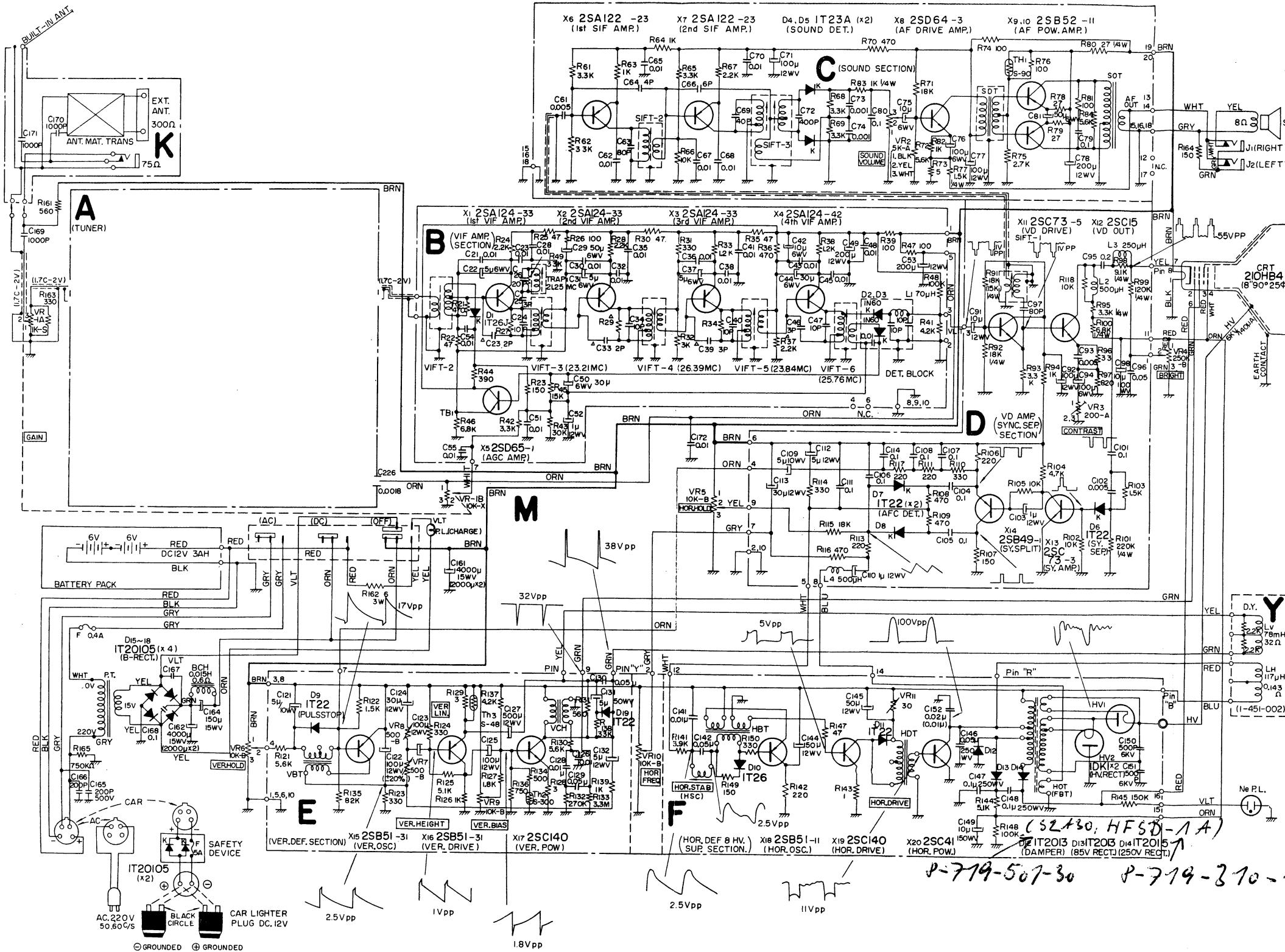
—Section A—

(for 8-301T)



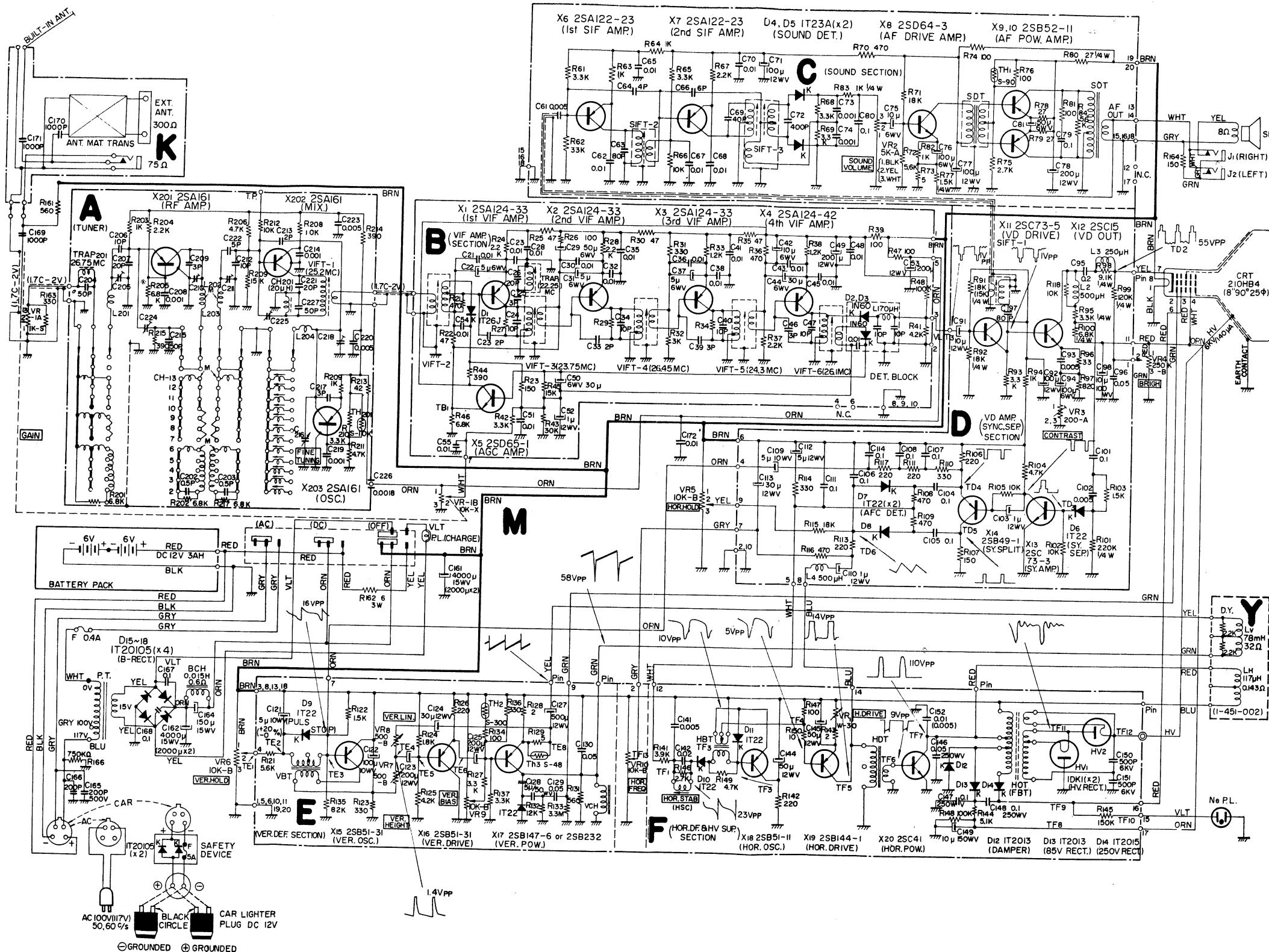
Schematic Diagram

(for 8-301E & T)



Schematic Diagram

(for 8-301W)



SONY CORPORATION